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U. S. NAVY



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TRUMAN H. NEWBERRY,
Acting Secretary.

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Medical
U. S. Y. M. C.,
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PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General, United States Navy.

NOTICE TO SERVICE CONTRIBUTORS

Contributions to the BULLETIN should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated, if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

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SPECIAL ARTICLES

POSTURE

By G. E. MORR, Lieutenant, Medical Corps, United States Navy

The importance of proper posture as an aid to health, strength, and agility was recognized in ancient days, as is shown in the writings of the early Romans and Greeks and in the even earlier writings of the Egyptians, Israelites, and other ancient peoples. From the middle of the decline of the Roman Empire until early in the nineteenth century less and less attention was paid to posture, with, undoubtedly, great loss of efficiency among the people. Fortunately, for the past 50 years posture has again been recognized as an important study and a still increasing interest is being shown in it.

Muler (1) calls attention to the marked difference in the human figure in ancient days and during the period of the Renaissance. Of the earlier days he says:

"How supremely calm, how dignified and superior, and how delightfully harmonious the antique classical figures are! In them you never see a muscle on the strain, unless this be called for in the position or movement represented. Everything bears the impress of perfect health and beauty; arched chest, broad and rounded shoulders, slender hips, the muscles of the trunk full, and the limbs substantial at the root but growing gradually more slender toward the delicate wrists and ankles. It is from this company you should select your model."

How different this picture is from the average person to-day!

Not only, however, does correct posture add to the beauty and grace of the human figure, but its absence leads to numerous physical ills, such as indigestion, backache, and lessened capacity for mental and physical work.

Sir Arthur Keith (2), in a series of lectures to students, says of posture:

"It is incorporated in the when, where, and how of man's acquiring his erect attitude. At what period in the history of the world the

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change in man took place is very difficult to state. It is safely locked in the fossil remains of man, and, as yet, it has not become definitely known as to the date, place, or manner in which human posture became evolved. * * * By the study of comparative anatomy one can not help being impressed by the fact that this change took place many, many years ago. * * * The assumption of the erect posture has had a dominating influence on the muscles of the human body, and the study of muscular action throughout the mammalia shows that the orthograde functions have been superimposed on muscles adapted originally for plantigrade motion; new muscles have not been called into being."

The latest muscular functions to be acquired by man are, according to Mackenzie (3), the stiffening of the knee by the quadriceps muscle, thus making possible the standing attitude; and the ability to raise the arms, though dependent, above the head.

The posture that we now recognize as being the best from an economical standpoint is one of balance, in which the pull and contrapull are so well equalized that the trunk is well balanced upon the hips and the entire weight well carried upon the feet. This type of posture, in all probability, is of recent origin. Posture, as we know it in the service, is probably the outcome of a certain brace taught to those engaged in warfare. Constantly repeated drills lead to uniformity of posture, and this posture we recognize as distinctive of the fighting man.

The military posture must have had a very early beginning, as it is found as early as 2,750 B. C. Garrison (4), in his Notes on the History of Military Medicine, calls attention to the fact that the ancient Sumerians who occupied Mesopotamia, and who added so much to civilization, had a highly organized military service. Bas-reliefs show helmeted warriors of that race who carried themselves with a decided military brace or posture.

Greece and Rome, as has been stated, paid great attention to physical training, both military and civil, and their system of gymnasia and baths did much to raise their physical status to a high level, where it remained until the decline was well under way.

According to Blundell (5), who published a delightful book on physical training in 1864, physical exercise was recognized as a branch of the medical art before the knowledge of drugs had advanced to any great extent. He tells us that Herodicus and Hippocrates judged it to be "as much the physician's duty to provide against diseases in the healthy man as to cure him who was already attacked." Physical exercise at the gymnasia was the means by which this "preventive medicine" was practiced.

Soldiers studied these exercises for warlike purposes and went through a severe discipline with them. The most skillful ones were

rewarded with an increase of land or of corn. Others had to accept barley bread and to show at appointed trials that they had mastered all of the military exercises. Later, forced marches and other hardships of actual warfare were substituted for these exercises, much to the detriment of the physical well-being of the people.

Hartwell (6) divides the phases through which physical training has passed into four—the Greek, the monkish, the military, and the modern. In the first, it was favored; in the second, tolerated; in the military phase, it was neglected; and in the modern, it is condemned. Fortunately, since Hartwell wrote, another phase has set in in which physical training is again favored.

Hartwell further tells us that when Winchester College was founded its founder, William of Wykeham, prohibited every kind of sport; that Henry VIII fostered the practice of martial exercises throughout the realm, and himself excelled in them. In Germany the reformers urged the revival of gymnastics as a part of the education of all classes of youths, and since the latter part of the eighteenth century gymnastic training has occupied a prominent place in Germany.

The great progress made by Germany in gymnastics is due almost entirely to one man, Friedrich Ludwig Jahn, familiarly known as "Father Jahn." He was stimulated by the writings of Rousseau, and about 1811 succeeded in having established in Berlin a gymnasium, of which he was placed in charge.

The word "posture" made its appearance in literature early in the eighteenth century, and it was used much as it is to-day. It referred to the relative disposition of the various parts of anything—that is, the position and carriage of the limbs and the body as a whole; attitude; poise. About the middle of the same century a verb, "posture," appeared. It means to place in a particular attitude—that is, the placing of the body, the hand, or limb of a person in a particular attitude—and posture masters were those who instructed individuals in certain acrobatic exercises and who were really the early acrobat or contortionist of the circus. The drill book which appeared about this time came to be known as the "posture book."

As has been said, toward the latter part of the eighteenth century attempts were made by the medical profession to correct physical defects and weakness by exercises; these are arranged upon scientific principles learned through study of anatomy and physiology. On the Continent both medical and surgical gymnastics were carried on to limited degrees.

Nachtigall, in Denmark, and Ling, in Sweden, made systematic gymnastics popular and general among their countrymen. To Ling was due the development of the system of medical gymnastics known

as the Swedish Movement course and also a system of bodily training still much prized in Sweden and Norway.

In this country Benjamin Franklin was one of the first to advocate physical training for students. R. Tait McKenzie (7) says that Franklin, in the pamphlet written in 1749, which led to the founding of an academy (now the University of Pennsylvania), advocated strongly the inclusion of physical exercise in the curriculum of the school. Also that, about 40 years later, Thomas Jefferson, in writing to Peter Carr, said: "Give about two hours of every day to exercise, for health must not be sacrificed to learning."

Probably the Round Hill School, established at Northampton, Mass., in 1823, was the first school in this country to make gymnastic exercise a part of the regular course of instruction. In 1825 the Tremont Gymnasium was established in Boston, with the prominent surgeon, John C. Warren, as its president. In 1860 the first chair of physical education was established at Amherst.

Archibald Maclaren, of the Oxford Gymnasium, seems to have been the first to use photography to record the results of the exercises carried out in the gymnasium.

Just before the outbreak of the Civil War a great interest had sprung up among students in gymnastics and athletic sports. This continued after the war. At the same time a little interest in gymnastics began to be manifested by girls and women (7).

The first public school in America to use physical training in the regular school program was in Cincinnati. This was in 1860. In 1869 Philadelphia followed this example. In 1897 there were 34 normal schools of physical training, 192 graduates of which were reported to be teaching physical training in the public schools of America. All systems apparently were taught. In 1885 the playground movement was started in Boston. This proved a great stimulus to the physical training of children.

The interest in posture is an ever-increasing one. Many are now interested, and schools and large industries, recognizing the necessity for correct posture among their pupils and employees, are engaging specially trained instructors to conduct classes in corrective exercises.

Good posture has many things in its favor, as is shown in an excellent article which appeared in *The Nation's Health* of September, 1924. The writer says (9):

"'Good posture for health' is the slogan of physical culturists. * * * 'Good posture for beauty,' say the artists. * * * 'Good posture for efficiency,' demands the industrialist. * * * It is, of course, not without expenditure of energy that erect posture is maintained. A soldier at attention * * * expends 22 per cent more energy than in positions of ease. Much less definite of measure-

ment, but quite as real, is the fatigue resulting from sagged muscles. * * * In the matter of posture Nature never uses ligaments, but always relies upon muscle, striped or unstriped, for the purpose of support. In cases of bad posture the internal attachments of the organs are subject to strain only after the muscles, the first line of defense, have broken down.

"Bankart declares that the presence of faulty posture suggests, in the first instance, a faulty nervous mechanism. This fact and the intimate relation between mind and power and muscular skill, often overlooked by those who cherished the modern fetish for calisthenic exercises, is the basis for the theory of F. Matthias Alexander, who insists that the prescription of stereotyped exercises is futile, even harmful, unless the sympathetic nervous system is first subconsciously brought into line by a sympathetic understanding of the result to be accomplished. In any case discriminating use is always to be made of strengthening exercises. The patient is to be treated—not her muscles only—and the whole procedure is to be directed toward restoring the integrity of the spinal reflexes which maintain without conscious effort the ease and physical power which all so greatly desire.

"The understanding and cooperation of the patient is necessary from the start. The 'feeling of correct posture' can not be too strongly emphasized, and the method should be made to develop the 'postural sense' in the mind of the patient."

Because of the close relationship existing between the motor and the psychic areas, muscle culture is very effective in developing brain centers. Hence motor education is necessary for the young (10).

The commandant of the Army War College a few years ago issued some instructions to the student officers of the school in which he stressed the importance of a correct posture. They express so clearly and concisely what constitutes good posture and the benefits to be derived therefrom that it seems advisable to quote them in full. He said:

"If the body is used rightly, the head is held up, with the chin drawn in, and the blood flows to and from the brain easily. In this position the wits are most keen, the reactions are quick; it is the position of alertness. In the erect position the chest is held up, the breathing is carried on easily, and the circulation is at its best. A person so standing has much better color than when the body is drooped. In this erect position the ribs are drawn up, so that the diaphragm is raised, the abdominal wall is drawn in, and abdominal organs must be held in reasonable position. The stomach must work better, the liver must work better, the bowels must work better, all of the other organs must work better than if they are sagged, as they must be when the body is drooped.

"The same thing is true of the feet and the back. The chief cause of many of the cases of weak or flat feet or of weak or tired backs is the wrong use of the body. Learn to stand up straight, with the proper balance of the body, and most of this trouble will disappear.

"Practice many times a day drawing yourself up to your full height. Feel tall. Draw in the chin, pull up the chest, draw in the waist, so as to flatten the back, and feel the weight chiefly on the front part of the feet. In walking, try to maintain the same position—swing along with body held tall as if you owned the town, not as if you were ashamed of your town or of yourself.

"In sitting, keep the trunk of the body in the same position as when standing: do not bend at the waist line; do the bending at the hips. Lean backward or forward as much as you choose, but do not buckle in the middle.

"In lying down, lie flat; get rid of the pillows. Lie on the back or face or side, as best suits you, but do not curl up and buckle in the middle. Give your organs a chance to work properly, especially at the time of rest. Sleep will be quieter and you will wake in the morning rested, with 'snap and pep' enough to tackle the tasks of the day and make hard jobs seem easy.

"Never forget that the best way to use the body for all purposes is as if it were stretched up as tall as possible, with head erect, chest drawn up, and with the waist or abdomen drawn in.

"Whether old or young, this should be learned; but since it is much easier to teach the child than those older, see that the children around you are so guided until you become proud of their good carriage. Their improvement will stimulate you to greater effort, until this carriage becomes the habit, and once it has become instinctive to stand well poised it will be hard to lose it. A strong, well-poised individual is better stock to be responsible for the next generation than the drooped type so commonly seen to-day.

"Stand up, sit up, stand tall, sit tall, throw a big chest, make your waist and abdomen flat, stand or walk forward on the feet. Be strong and healthy and get the spring and joy out of life, which are hard to find when the body is weak and drooped."

Sir Arthur Keith (2) states that the problems relating to evolution of posture have a direct bearing on medical and surgical practice in that many obscure conditions requiring treatment are manifestations of a disturbance of the mechanism which maintains and regulates the posture of the human body.

To maintain the ideal standing position it is necessary to have: (1) A normal bony framework, (2) a strong and evenly balanced muscular system, and (3) a normal functioning nervous system (11).

Walter Aamold, instructor in physical training at the United States Naval Academy, states that the true foundation of posture as related to good health is located in the pelvic region (12).

Goldthwait describes good posture as a position in which the body is held as tall as possible and with the least strain. The head is erect, the shoulders posterior to the center of gravity, the chest is high, the abdomen is flat, the spinal curves are not exaggerated. The pelvis is tilted slightly upward in front and down in back. The muscles are in balance and the weight is on the balls of the feet.

Stafford (11) tells us that the emphasis should not be laid on pushing the shoulders back. Rather one must learn the proper tilt of the pelvis and good abdominal control.

Man is the only animal in whom the entire upper part of the body is supported erect on the spine over long intervals. The demand on the neuro-muscular mechanism is even greater in the sitting than in the standing position (2).

According to the Life Extension Institute's reports, 44 per cent of those examined have faulty posture. Other investigations show that fully 80 per cent of all school children have postural defects. Children will not outgrow these defects, but they can be remedied by proper exercises (11).

Dickson (13), in a discussion of the effect of posture on the health of the child, shows that the symptoms produced by poor posture are based on muscle strain and fatigue and early visceral ptosis. The usual symptoms are leg, knee, and foot ache, tire and fatigue, nervousness, irritability, restlessness at night, lack of concentration, and poor progress at school. The visceral ptosis may lead to gastric attacks with nausea, vomiting, and fever. Chronic constipation often results and brings with it all its attending evils.

Many types of faulty posture have been described by various writers. One of the best divisions is that of Lovett, who describes three main types, with several subdivisions. As stated by Stafford (11) these are:

FATIGUE POSTURE

"(1) With the head and abdomen forward, the chest drooped, and increased physiological curves. Weak feet generally complete the picture. This type of individual is generally poorly developed muscularly and often shows a ptosis of the viscera. This type has its variations in the following subdivisions:

"*a. Round back.*—The dorsal and lumbar spine form one continuous convexity backward. On first examination it will appear that there is a sharp lordosis present, but on closer examination this

will be found to be 'merely the upward and forward slope of the sacrum and that the lumbar spine does not share it.' 'In counting the vertebrae it must be remembered that the spine of the fourth lumbar is, as a rule, on the level with the top of the iliac crest, and it is the first vertebra below this level which will mark the end of the spine.'

"*b. Round hollow back.*—This shows a marked lordosis as well as the exaggerated dorsal curve of kyphosis. This type may not be distinguished from 'plain round back' unless the back is bare.

"*c. Round upper back.*—In certain cases the dorsal backward curve occurs in the upper part of the spine and gives an especially noticeable forward thrust to the head and a prominence between the scapulæ. These cases are likely to be rigid, and respiratory capacity is poor. The lumbar physiological curve is not necessarily abnormal.

"*d. Flat back.*—Bowen and McKenzie describe this as the gorilla type 'due to weak abdominal muscles and a sagging of the abdominal organs. The lumbar curve is obliterated and may even show in a backward convexity. Sitting with the buttocks slid forward in the seat of the chair and the weight borne by this point and the upper dorsal spine gives a position which is sure to exaggerate the condition.'

"THE BANTAM POSTURE

"2. This posture, rather than being caused by slumping, is caused by a child trying to 'throw his shoulders back.' A marked lordosis is present and the position is only maintained as a strained pose.

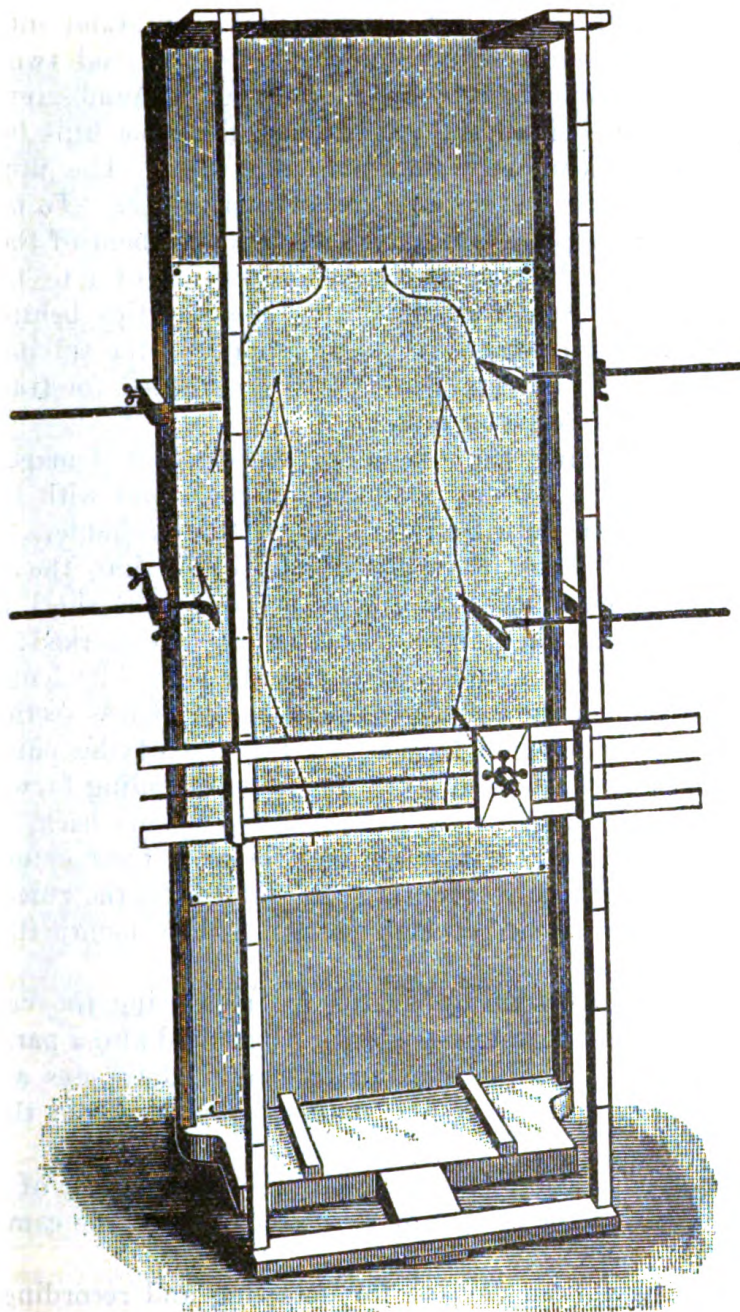
"LATERAL CURVATURE OR SCOLIOSIS

"3. The first and third type of posture may occur jointly."

Permanent records and measurements of postural defects were being made in America by Hitchcock, at Amherst, in 1861, and by Sargent, at Harvard, 1879. In England, Maclaren was taking measurements and using photographs to record defects in 1861. Since that time many methods have been devised for the recording of posture. We find that Dr. Harvey Kellogg has been a close student of posture and its relation to disease manifestations for more than 50 years and his observations have been many and noteworthy. Prof. W. L. Ling published his book in Stockholm in 1880. Under general theories he says: "When the movement is done the class stands still until something else is ordered, and now the teacher will occupy the pause by moving about correcting by word or by action those who have a faulty posture."

The instrument which Doctor Kellogg used for securing his outline was a frame which was set about 2 feet from and parallel to the backboard against which the subject stood. The paper on which the tracing was made was fastened to this backboard.

The subject was made steady against this board by four arms, two on each side, at the level of the hips and shoulders. The tracing arm was so arranged on the frame as to be capable of up-and-down



Apparatus for tracing an outline of the body:

FIG. 1.—Kellogg's original apparatus

and side-to-side movements which allowed the tracer to follow the body contour very closely and resulted in a correct tracing of the body outline (14).

Schulthess devised a machine of the pantograph type which gives life-size tracings. R. T. McKenzie described a very simple and clever apparatus to record deviations of the spine. This record is traced on paper to the scale of 1 to 4; it is called the McKenzie scoliosimeter. It consists of a horizontal iron stand into which a rigid upright rod is firmly screwed. To this rod two jointed arms are attached by movable collars clamped by thumbscrews. The lower arm passes behind the patient and fixes the hips by means of clamps, preventing any sideward movement. The upper arm passes in front of the patient and fixes the shoulders. To the collar of the upper arm a plate is hinged for the attachment of the pantograph set to make the tracing in the proportion of 1 to 4. Ruled paper is stretched over the plate and held by clips behind. The pointer should be adjustable in length, short for the tracing of the spine and scapulæ, and capable of being lengthened for tracing the outline of the shoulders and hips.

To make the tracing, the spinous processes are first marked with a flesh pencil. The patient is placed on the stand with the heels together, the hips clamped at the level of the trochanters, and the shoulders clamped after the patient has settled into the habitual position. The line of the spine is followed by the short pointer; the gluteal cleft and the points of the scapulæ are marked; then an outline of the shoulders and hips is rapidly traced by lengthening the pointer to touch the most prominent parts. Cross sections may be taken to show rotation by passing the end of the pantograph across the back at the desired level, the patient bending forward. A tracing of this kind gives an accurate map of the back, showing the difference in levels, deviations, and rotation, their extent being to scale, and estimated by counting the squares on the ruled paper. These tracings should be repeated from month to month through a course of treatment.

Lovett (7) describes an apparatus for measuring the variations from the normal in the antero-posterior plane, and also a pantograph by which a tracing could be made. Bernard Roth uses a flexible strip of tin across the back and makes a tracing from this upon paper.

To diagnose deviation from normal, E. G. Brackett, of Boston, has a frame with wire (2-inch wire mesh) between the camera and the subject.

Many tests have been devised for detecting and recording deviations from normal posture in school children. Among the best of these are the test devised by Bancroft (15) and the Michigan public-school system (11).

Another test employed by the Life Extension Institute has the virtue of simplicity. An upright board is used. If the posture is cor-

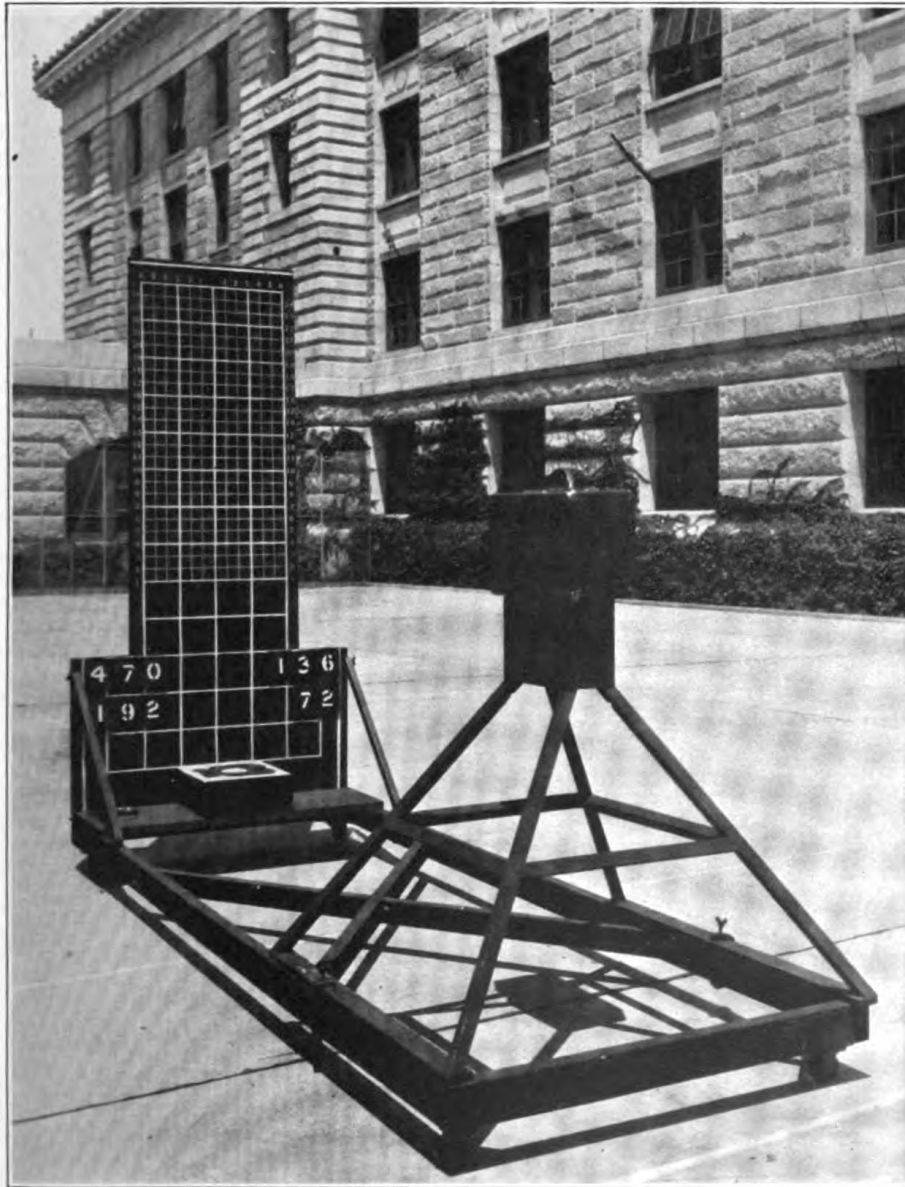


FIG. 2.—AUTHOR'S APPARATUS. USED AT THE UNITED STATES NAVAL ACADEMY

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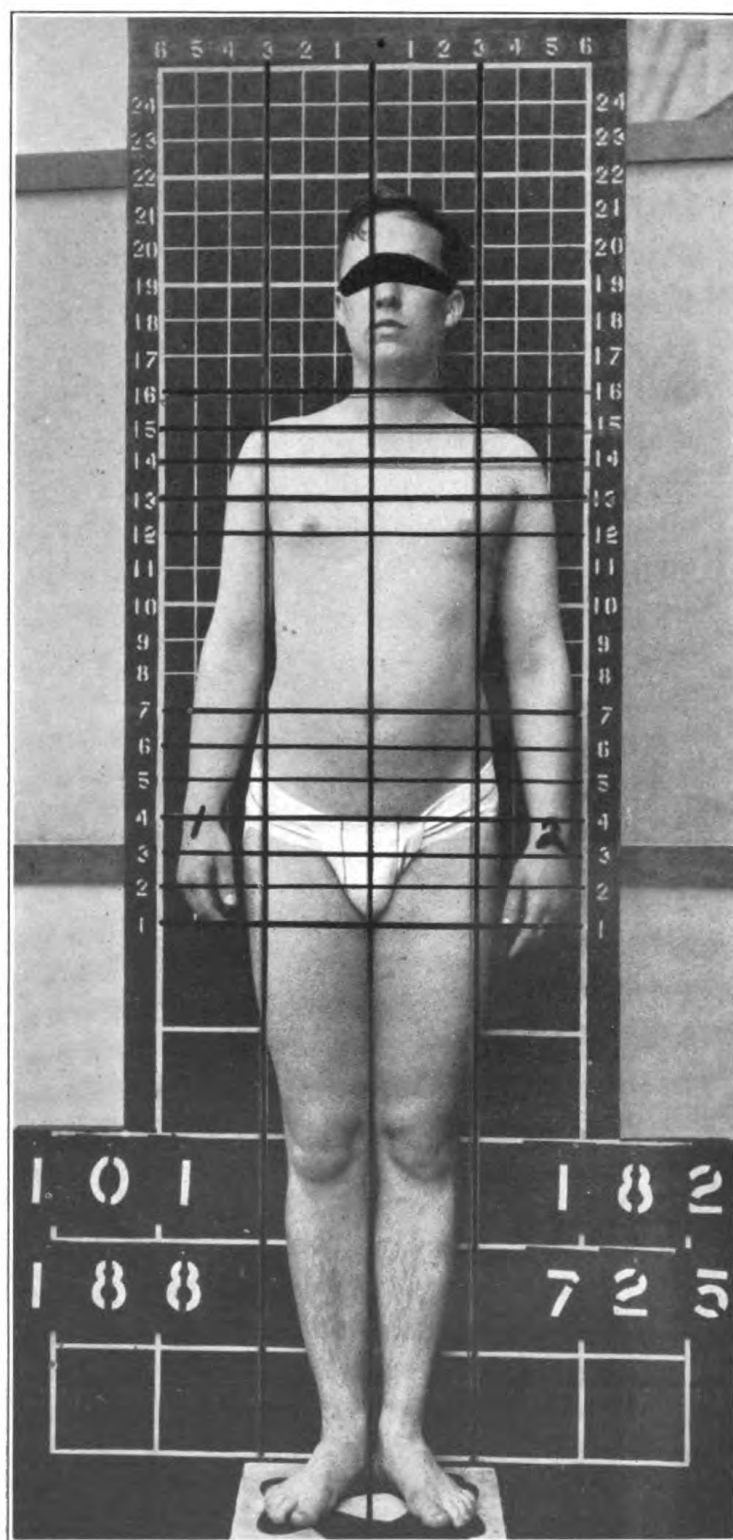


FIG. 3.—BODY TO LEFT FROM HIPS. NUMBERS ON SKIN
SIGNIFY DEFICIENT MUSCLE GROUPS

10—2

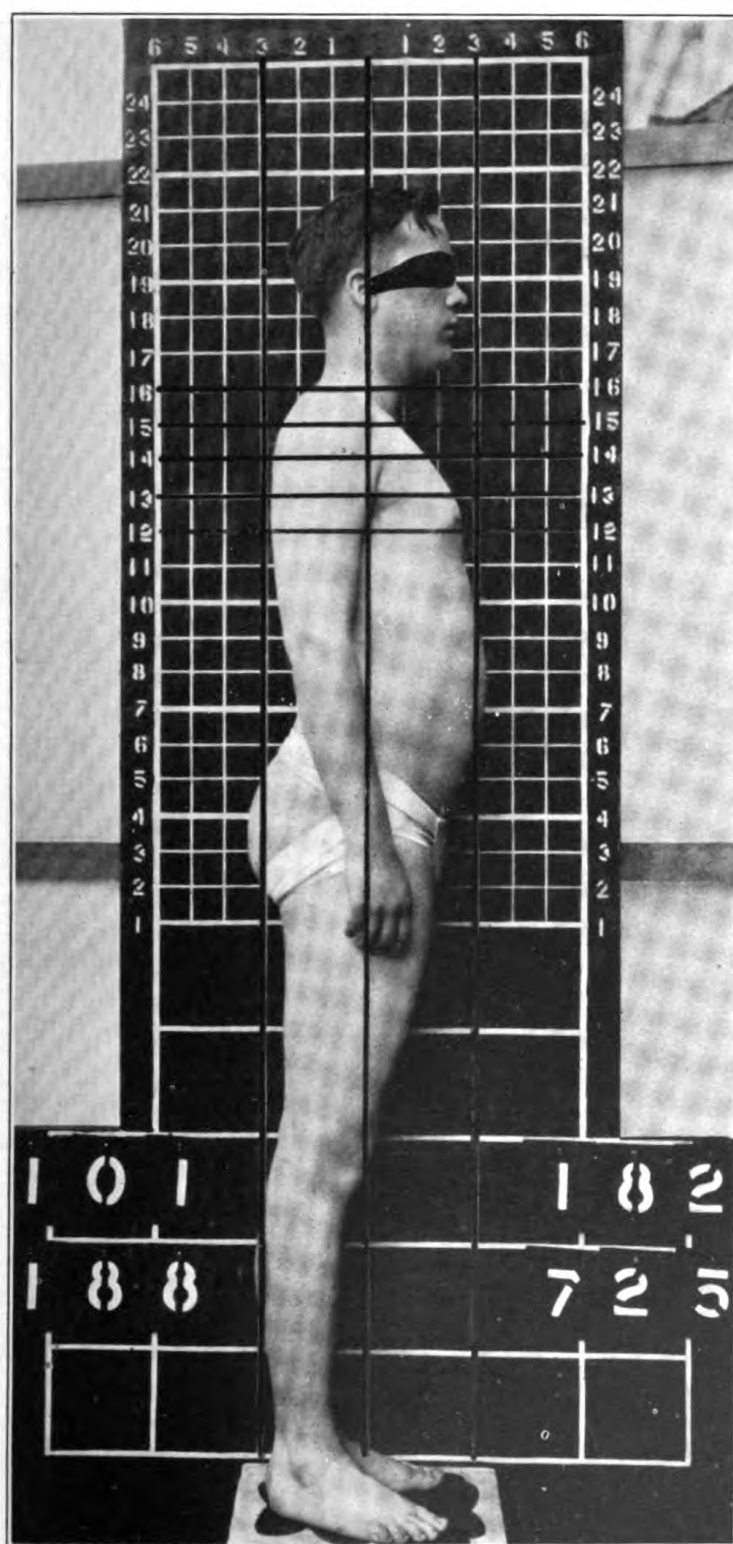


FIG. 4.—ABDOMEN OUT

10—3

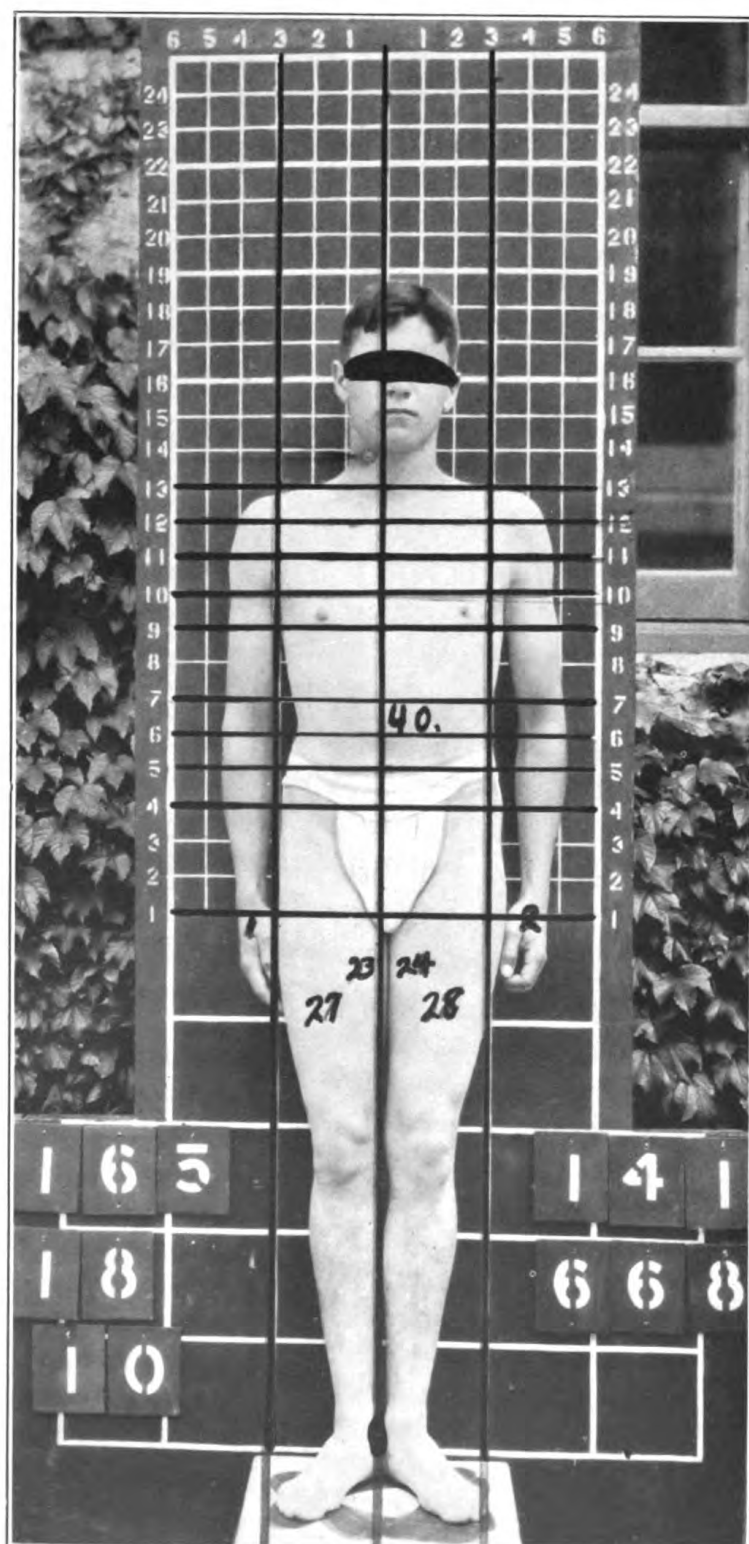


FIG. 5.—LEFT HIP HIGH

10-4

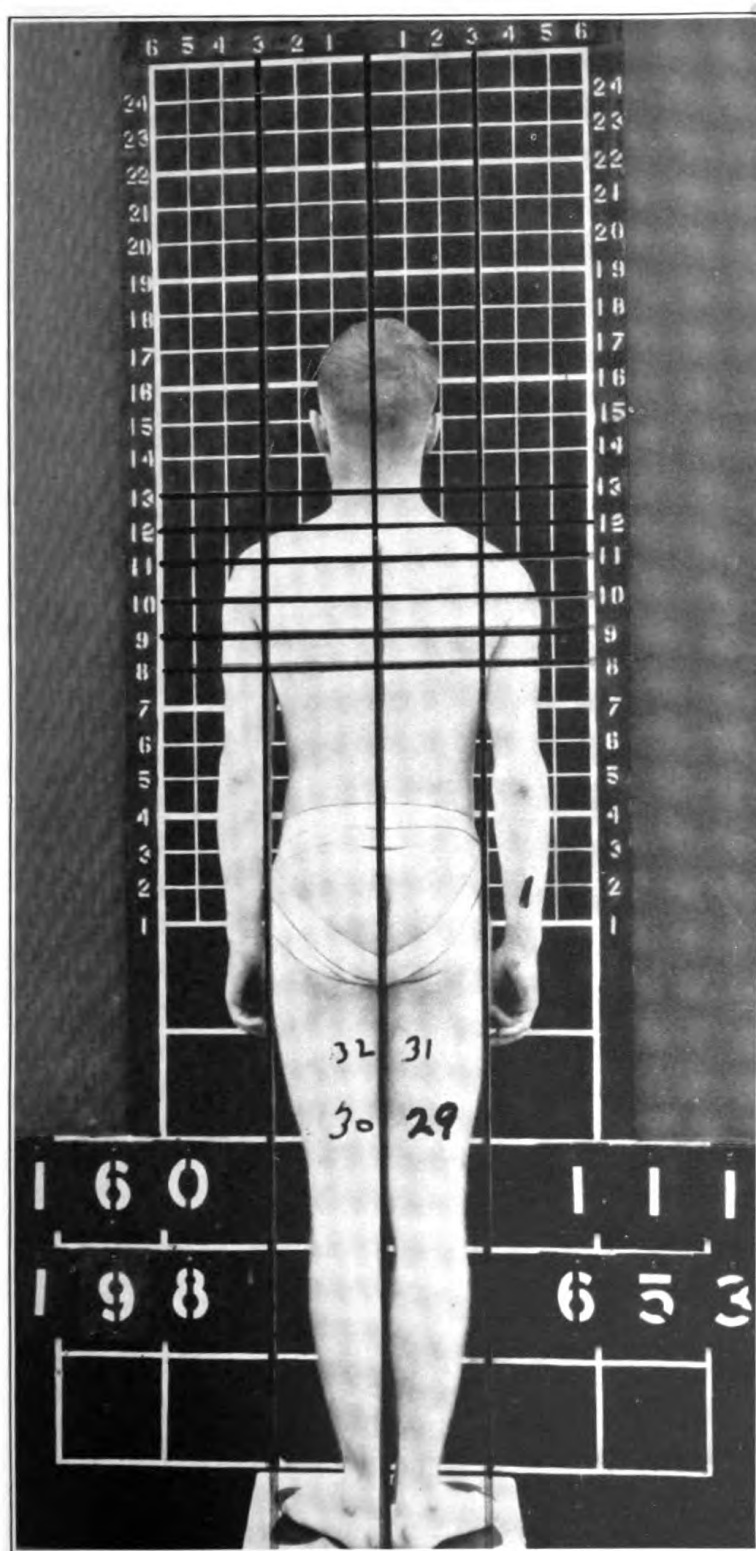


FIG. 6.—RIGHT SHOULDER LOW

10—5

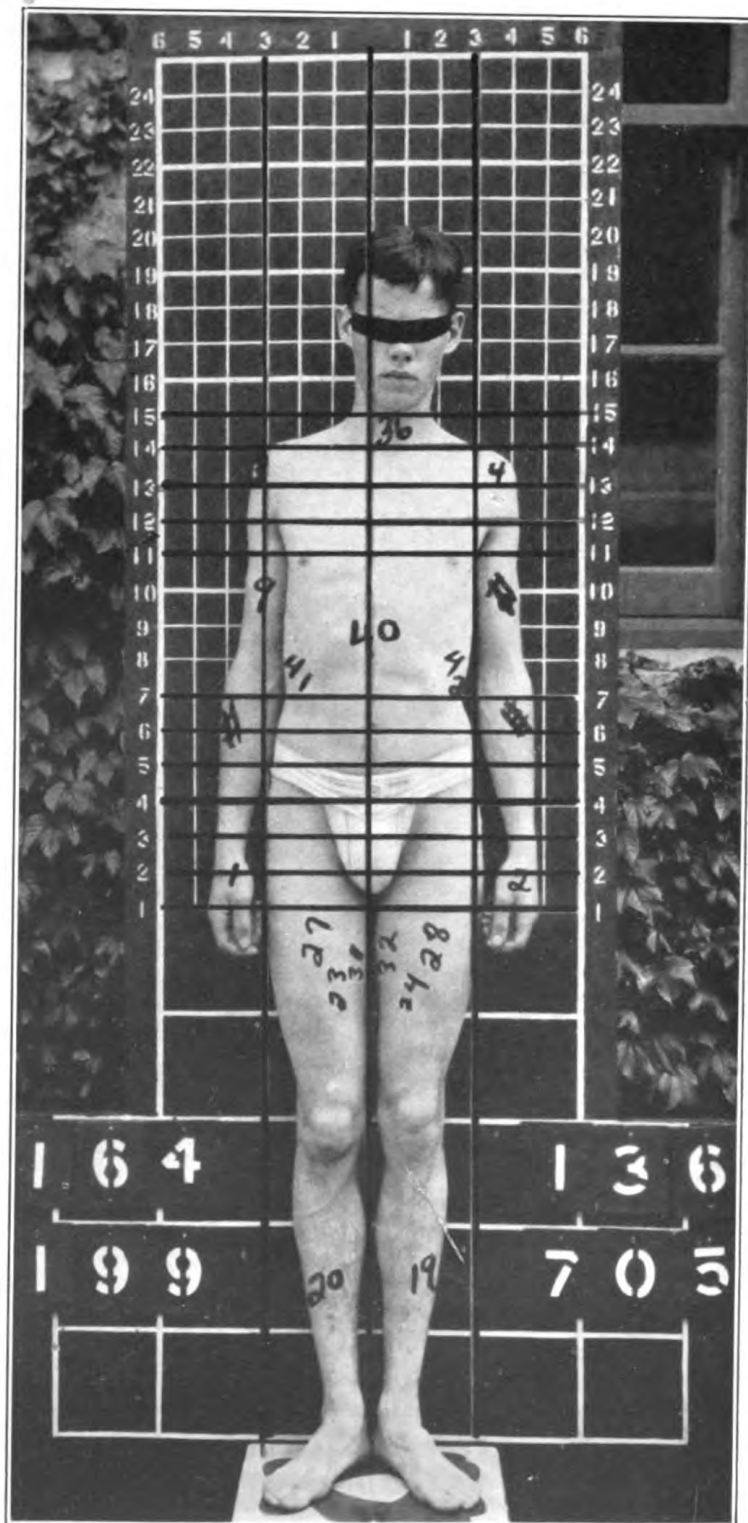


FIG. 7.—BODY TO LEFT FROM KNEES

10—6

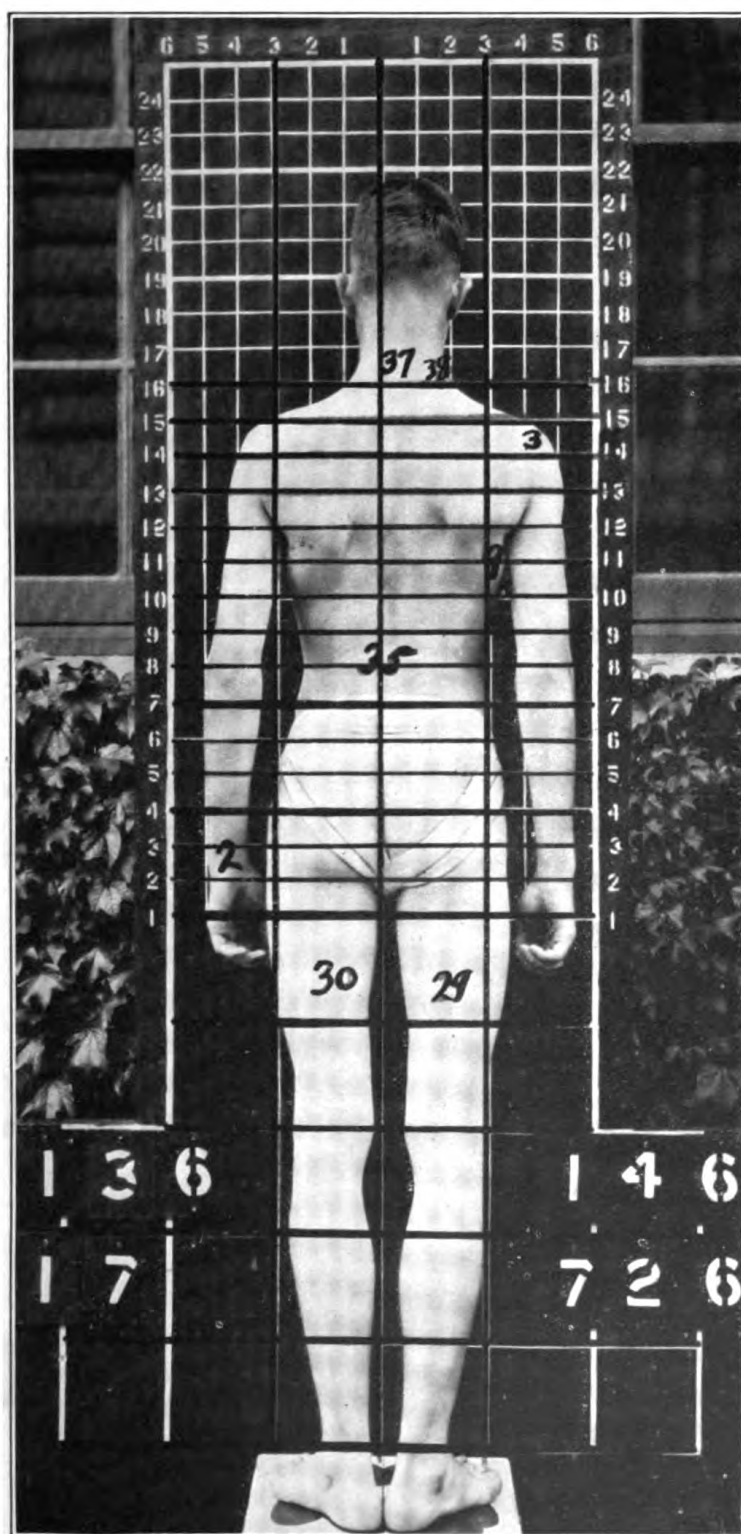


FIG. 8.—BODY TO RIGHT FROM ANKLES. KNEES APART

10-7

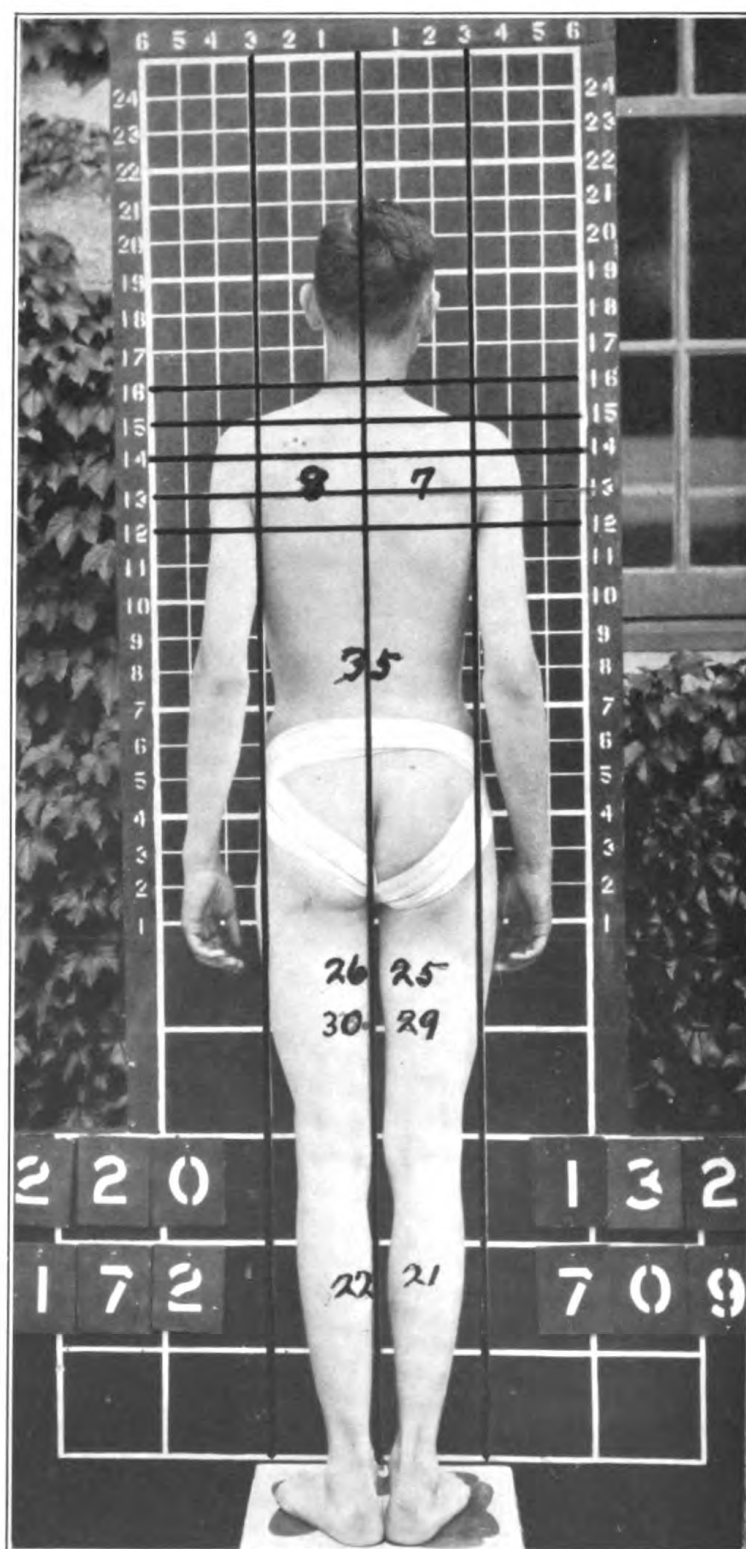


FIG. 9.—HEAD TO RIGHT

10—8

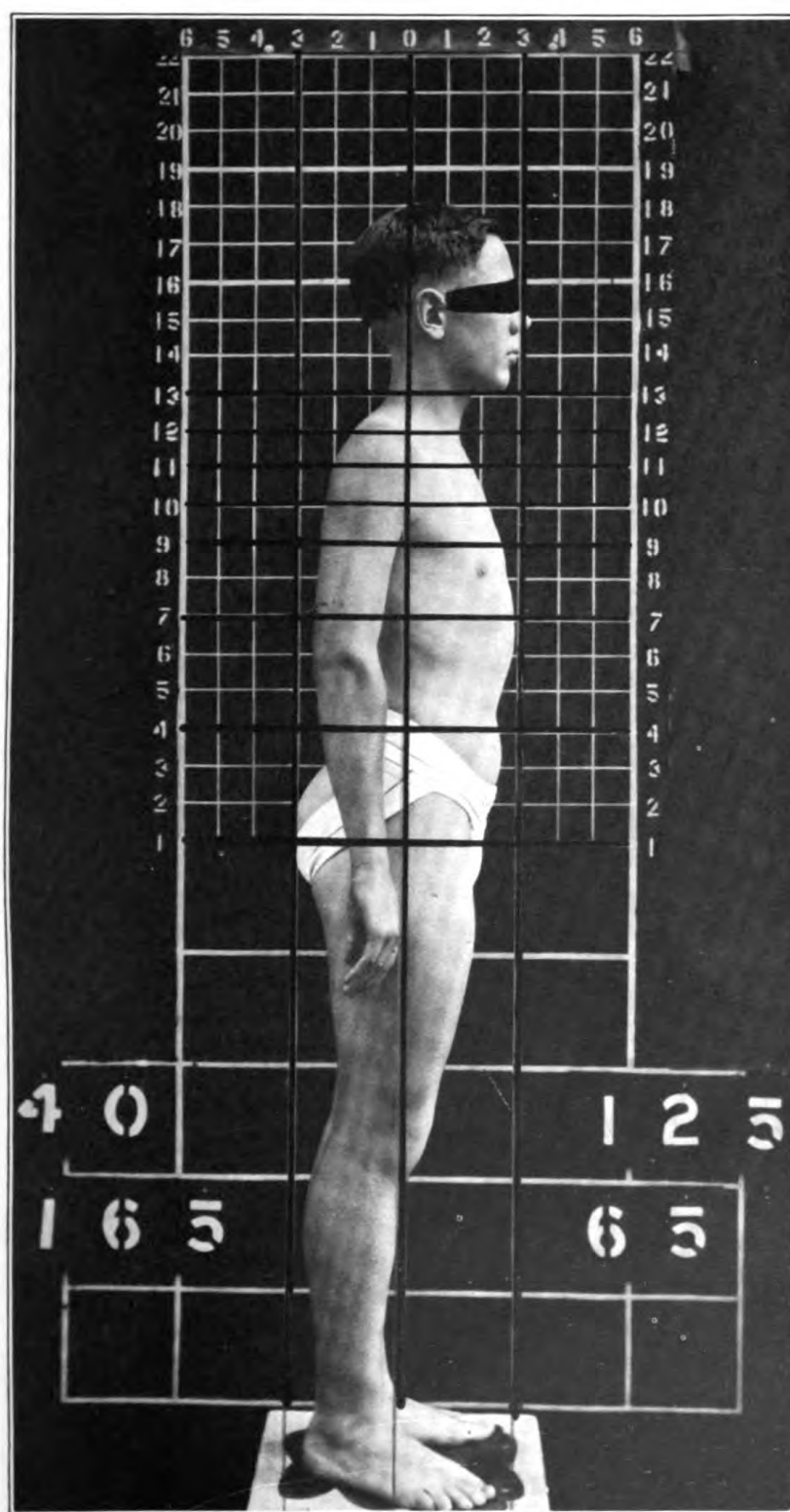
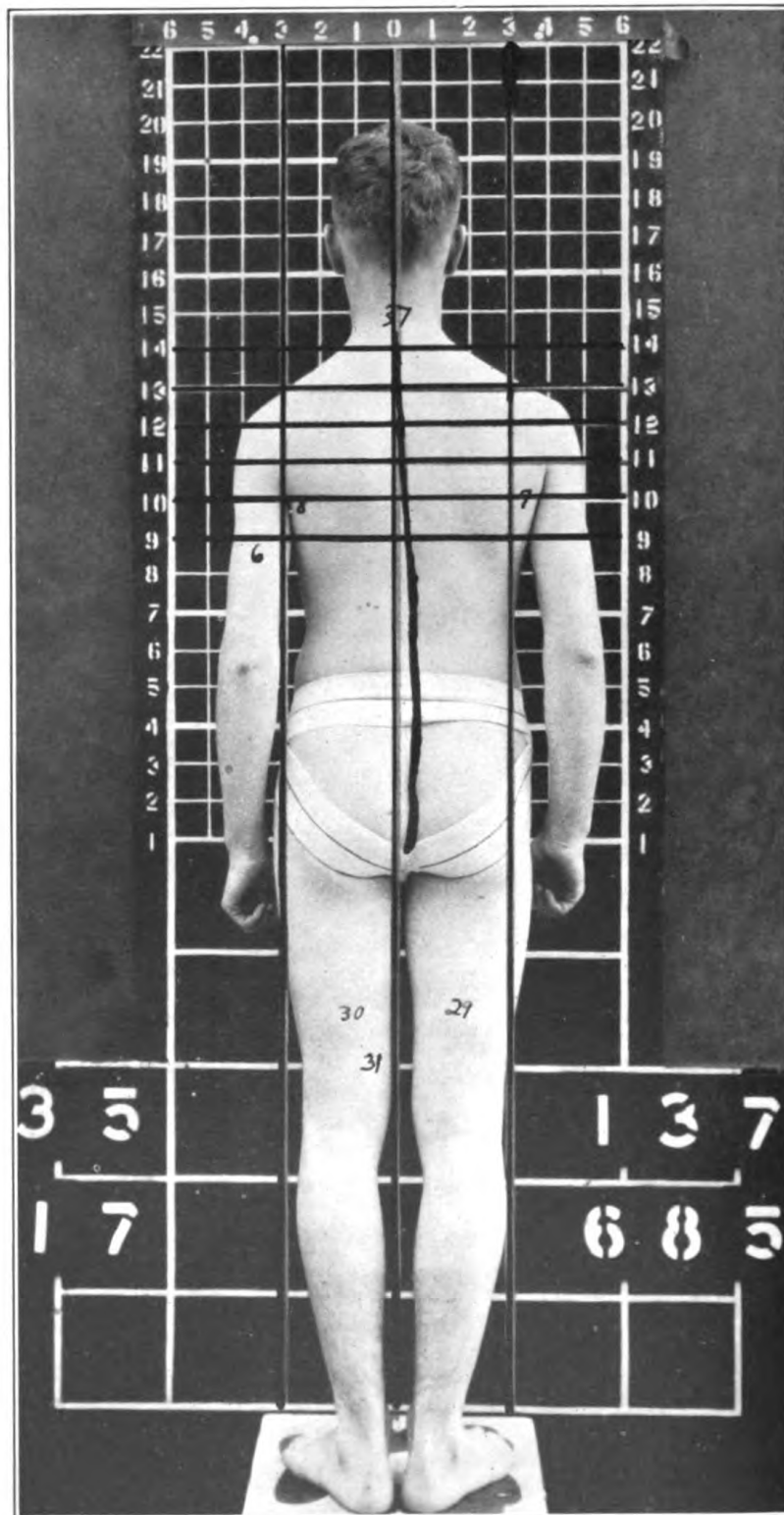


FIG. 10.—BODY FORWARD FROM HIPS

10—9



10-10 FIG. 11.—LONG RIGHT CURVE OF SPINAL COLUMN

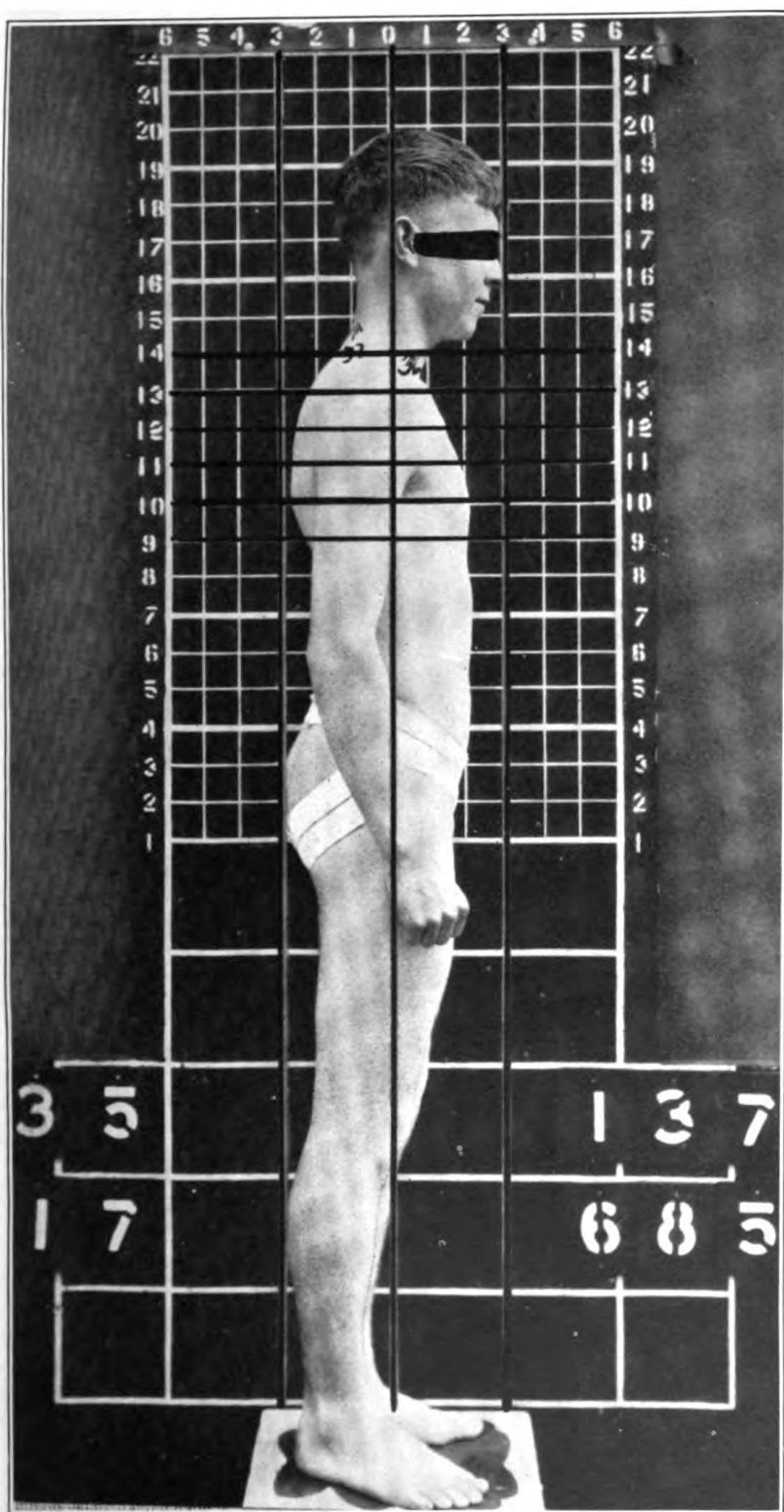


FIG. 12.—CHEST FLAT; SHOULDERS ROUND, LEFT LOW
10—11

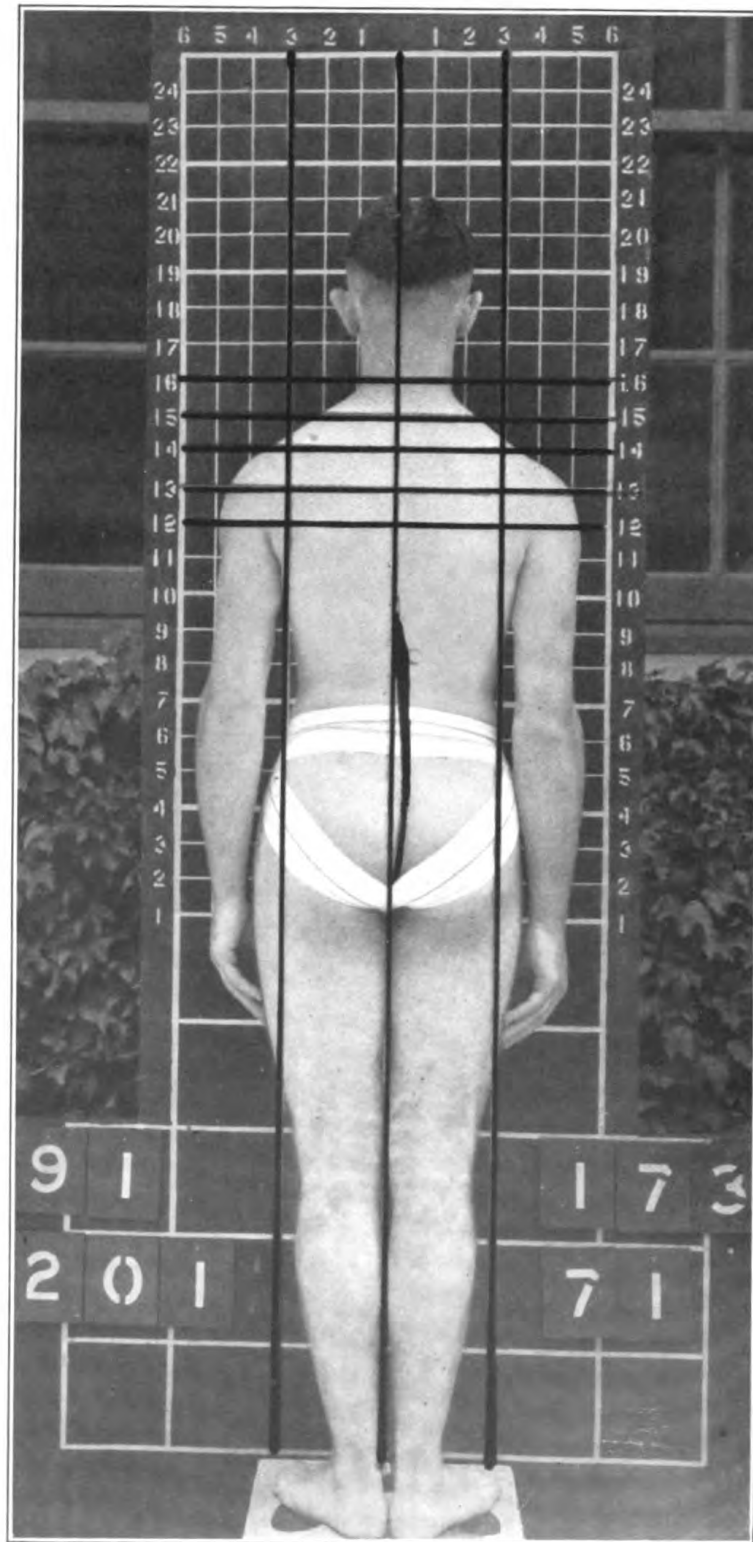


FIG. 13.—LOW RIGHT CURVE OF SPINAL COLUMN

10—12

rect, the board will just touch the toes and chest and will miss the nose by about one-half inch.

Fradd, of Harvard, has devised a "silhouettograph" which is used at that institution.

The American Posture League is carrying on important work among physicians and educators in calling attention to the effects of various features of life on habitual posture.

Kellogg (14) describes his method of posture study as follows:

"Everyone who has studied posture has encountered three embarrassing difficulties—(1) The absence of clearly defined standards as to what is good or normal posture; (2) the absence of exact terms for expressing deviations from normal; and (3) the lack of means of accurately determining and describing departures from the standards chosen as normal.

"I have gradually developed a method by which to overcome these difficulties. In order to make an exact study of posture it is necessary to have an exact outline of the subject. The method is based upon the proposition that the poise of the body, either sitting or standing, is determined by four essential factors—(1) The vertical balance, designated as (V. B.); (2) the pelvic obliquity (P. O.); (3) the chest ratio (C. R.); (4) the head angle (H. A.).

"*The vertical balance (V. B.).*—The vertical balance is the posture assumed by the standing or sitting body in adjusting itself to the influence of gravity. When the standing body is in normal vertical balance a line dropped from a point an inch or two in front of the ear will pass through the center of the plane of the obliquity of the pelvis and the foot at the instep.

"*The pelvic obliquity (P. O.).*—In the study of posture I assume as a fundamental proposition that the pelvis is a pedestal upon which the torso is balanced. By pelvic obliquity is meant the inclination of the plane of the brim of the pelvis from the horizontal. The obliquity of the pelvis is marked by a line passing from the pelvis to the promontory of the sacrum. I have found that if this line is extended backward it touches the tip of the third lumbar vertebra. The vertical axis of the body in the erect position passes through the center of this line.

"*The chest ratio (C. R.).*—The chest ratio expresses the relation between that portion of the chest which is in front of the vertical axis and that portion which is behind this line. The relation is determined thus: A line is drawn from the intersection of the vertical axis with the plane of the pelvis and the lower end of the sternum, which is normally the most prominent portion of the chest. Another line is drawn from the same straight point to a point at the back of the chest just opposite the lower end of the

sternum. The two angles thus formed are measured and the anterior is divided by the posterior. Normally the anterior angle is always larger than the posterior, never smaller. The difference is 10 to 20 or even more degrees, so the normal chest ratio may be said to be about 120 degrees.

"The head angle (H. A.).—The angle formed by the chin with the vertical axis is measured by a line passing from the chin through the upper end of the sternum to the vertical axis. This measures the degree of forward carriage of the head. A large head angle is associated with an exaggerated posterior cervico-dorsal curve. It is very likely to be found in persons with long necks. The head angle has a considerable range of variation. The normal appears to be about 18 and 25 degrees."

Postural defects are to-day studied with the aid of tests, charts, schematograph drawings, silhouettograph, shadowgraph, and mirrors.

That the value of physical training at the United States Naval Academy has been recognized from early days is shown by the fact that the first Academic Journal, issued October 6, 1845, recommended that a fencing instructor be employed and that "the exercise or infantry drill" be introduced.

The following report on physical training at the United States Naval Academy in 1869 is taken from "Description and History of the Naval Academy from its Origin to the Present Time," compiled by Edward P. Lull, lieutenant commander, by direction of D. D. Porter, Superintendent of Naval Academy:

UNITED STATES NAVAL ACADEMY,
Annapolis, Md., April 22, 1869.

ADMIRAL: In obedience to your orders, I have the honor to transmit the following report of the Physical Training of the Midshipmen.

The course comprises Fencing with small sword and broad sword, Gymnastics, Boxing, and Swimming.

Since the year 1850 instruction has been given in Fencing. For some years the Midshipmen fenced by gun's crews, thus throwing the classes together and hindering the development of the drill. Instruction was then given about once a week or once in 10 days; the course extended during the four years, excepting for a year or two when the first class was not required to exercise. During these years Professor Seager, Head of the Department of Drawing, taught the art.

In 1859 a Sword Master was again appointed whose sole duty was to instruct Midshipmen in the use of the broad and small sword and the bayonet; the latter was soon discontinued. He was supplied with assistants to aid in performing the work; instruction was given orally; such seems to have always been the practice. At present, fencing is taught by classes, and the knowledge gained is progressive and more thorough and extensive than under the old plan.

The fourth class, first year, is devoted to preliminary instruction in the balance motions, correct positions, advance, retreat, etc.; lessons are given once a week.

The third class, second year, have exercises once a week, alternating between the broad sword and small sword.

The second class, third year, the same routine.

The first class, fourth year, have two lessons per week, one devoted to each weapon.

These exercises all take place in the Gymnasium, a large roomy building, well lighted and warmed.

The Senior Instructor in Fencing has prepared a work, approved by a Board of Officers appointed by the Superintendent, for theoretical and practical instruction in the use of both weapons.

The second branch, Gymnastics, was instituted in 1867. The course is continued through the four years of Academic life, beginning with the youngest class who have Calisthenic exercises once a fortnight. Second-year Gymnastics, consisting of exercises of strength and agility, tending to develop the muscular system of the young gentlemen, and teach them reliance on their own powers. Third year the course is the same but embraces more difficult exercises. The last year is devoted to Boxing, once a fortnight. All these exercises take place in the Gymnasium.

Third branch, Swimming. There has been no regular instruction in this art, the want of proper swimming pool, and the fact that the Midshipmen are on their annual practice cruise in the months suited to open-air bathing in this latitude, have prevented the system from being carried out.

Beside the exercises above enumerated, all the Midshipmen are required to learn to dance, regular instruction being given them once a week until the Dancing master pronounces them proficient. There is also a Bowling alley and a Pistol gallery to which the Midshipmen have access in recreation hours.

Furthermore, the various drills in handling great guns, small arms, spars, sails, boats, light artillery, etc., are certainly powerful aids to the Physical Culture of the Midshipmen. With suitable provision for instruction of the Midshipmen in Swimming I think the system will be all that can be desired so that they do not deteriorate in Physique after their entrance to the Institution. I respectfully refer you to the record of Physical examination of each class, made before they ascend to the next higher one, and to a comparison with young men of the same age in any institution of learning of the country.

Very Respectfully,

CHARLES L. FRANKLIN, *Lieut. Comdr.*

Hartwell, in the excellent circular of information already referred to (6), shows that at Annapolis and West Point bodily training had received marked attention from the first. The discipline imposed upon the students at these academies rendered it easy to carry out a rigid system of training which could not easily be enforced in other institutions of learning. He considered that the best that had been accomplished in physical training in America up to that time (1885) had been accomplished at Annapolis and West Point and recommended that the systems there in use be studied by all who had to do with the training of boys between the ages of 12 and 20.

The department of physiology and hygiene was created at the Naval Academy on December 17, 1886, and Surg. Thomas D. Walton, United States Navy, was appointed head of the department. This department was abolished in 1891. From that time until 1909 a junior medical officer, under the direct supervision of the superin-

tendent, acted as officer in charge of physical training. The first to occupy this position was Passed Asst. Surg. Henry G. Beyer, United States Navy, who, in one of his early lectures, said: "Health and strength, then, being the outcome of exercise, any system or plan of education which fails to provide for the proper development of the human body is incomplete, vicious, and faulty. Spinal curvature, weak back, chicken breast, ungraceful gait, in many instances are the result of inattention to gymnastic exercise."

Capt. J. A. Murphy, Medical Corps, United States Navy, in 1911, was, perhaps, the first to study posture from a strictly naval point of view (12). Since that time various medical officers—among them Solhaug, Roberts, and Taylor—have, under the direction of the various athletic officers attached to the Naval Academy, and ably seconded by the gymnasium officers—notably, Lieut. Commander W. A. Richardson, United States Navy—carried on the work with zeal.

Read Admiral A. P. Niblack (16), who was on duty at the Naval Academy in 1908, when the new gymnasium was completed, was responsible for the purchase and installation of two universal dynamometers in the new gymnasium. With these machines tests are made of the 42 groups of muscles of all midshipmen upon entering the academy. A graphic record of every midshipman is made, and those found defective in one or more groups of muscles are given exercises especially designed to correct these defects. The result is that before the midshipman graduates and is commissioned in the Navy he has overcome all the muscle-group defects which he had upon entrance.

The procedure, as carried out at present, is as follows: After a midshipman enters the Naval Academy in June, and after he has received his uniform, been assigned to his company, and other necessary preliminaries have been attended to, he is sent to the gymnasium, where the tests of his muscle groups are made. Following this he is sent to the photographer, who takes his picture on the posturegraph. Three exposures (anterior, posterior, and lateral) are made. The photographs are lined. By using lines for comparison defects are easily detected. The defects are numerated on a form, and the midshipman and the gymnasium medical officer go over the defects as pictured. The midshipman is then given his strength-test chart, and from the chart the medical officer points out and explains the various muscle groups. The midshipman marks with ink in the proper place on the posture picture any defective group he may have. The number used to indicate this group is the number of the exercise that is recommended in the Manual of Athletic Requirements for the correction of the defective muscle group. (See illustrations.)

All pictures having been made in duplicate, the second set is marked in the same way as the original set. These are pasted on the first three pages of the manual, and the strength charts and defects in posture are copied in the same book. The exercises recommended to correct strength defects are checked and the paragraphs relating to correct posture are marked and called particularly to the midshipman's attention.

With the help of the gymnasium medical officer the midshipman now assumes the correct posture and is asked if he understands the subject and feels the correct balance of posture, and is able to keep himself in this natural, upright position without muscular effort. If he is able to do this, his book is checked under the date of this instruction; if not, the defects are pointed out and he is placed in the "posture squad" to receive special corrective exercises in the gymnasium until the defects have been corrected.

In order to study posture there must be a method for recording the postural defects which can be determined in degrees of error by comparison with certain known lines. The silhouettograph and the shadowgraph show only the body outline. Such essential factors as the spine and the hip-bone contour can not be seen except from an actual photograph. To secure the best results in the correction of postural defects it is necessary to stimulate the interest of the individual. One of the best ways to secure this stimulation is to show him his figure and point out the defects. A permanent record should be made of the posture, and the amount of improvement should be compared and noted from time to time. This will increase the subject's interest in his posture. The so-called posturegraph was developed to secure this interest, to develop a system of making observations, and to obtain a permanent record of posture. The writer, in collaboration with E. J. Calleran, chief photographer, United States Navy, originated the idea of the posturegraph used at the Naval Academy. It consists of a wooden frame 4 by 11 feet, set on casters. At one end is a tripod for the camera: at the other end is an upright board in the shape of an inverted T. This board is 8 feet long by 4 feet wide; 2 feet from the base the width narrows to 2 feet and 6 inches. On this board, which is painted black, white vertical and horizontal lines, which mark off 6-inch squares, are drawn. Beginning 3 feet from the base, the upper 6-inch squares are subdivided by white lines into 2-inch squares.

Attached to the frame, in front of the board, is a pedestal 6 inches high and 15 inches square. Its top is marked with 45° angles for the position of the subject's feet when standing in the front, back, or side position.

Errors in posture are regarded as part of the strength-test requirements for the first year at the academy, but in the second and third years they become part of the gymnasium requirements.

During the third, second, and first class years the midshipmen receive lectures and demonstrations on postural defects. The causes and correction are studied under an instructor with the aid of the posturegraph. They criticize and correct each other's posture at attention, and later make observation and comments on marching postures.

Following the strength test, midshipmen are required to fill out a printed card showing their athletic record before entering the academy; what particular sports they participated in and in what capacity; records made; any injury received; and in what sports they are desirous of taking part. On the back of this card are blank spaces for entering future data as to the athletic achievements at the academy. This card is for statistical purposes and is not used in assigning special training.

Every midshipman is required to learn to swim satisfactorily and to apply properly the Schaffer method of resuscitation of the apparently drowned.

The department of physical training fully realizes the importance of the fact so well expressed by Dr. T. D. Wood, of Columbia University: "It is desirable that the teacher and supervisor of health education should be in the best possible state of health; in truth, should exemplify in person and conduct a fine quality of health of body, mind, and character, so that, in the highest degree, the direct and more subtle valuable influence of personal association of teacher with student may be assured." These ideas have been most carefully adhered to in the selection of instructors for physical training.

Along with the many methods employed in the study of posture, various methods of recording the postural findings have been developed. Some institutions employ the terms used by Lovett, enumerated above. Many use the classification developed at Harvard. There posture is graded as: "A," good body mechanics; "B," fairly good body mechanics; "C," poor body mechanics; and "D," very poor body mechanics.

Dr. L. T. Brown, of Harvard, made a thorough study of the freshman class which entered in 1916, with the following results: "A." 7.7 per cent; "B." 12.5 per cent; "C." 55 per cent; "D." 25 per cent.

The University of Michigan in 1924 reported that for the past 27 years the freshmen on entering the university showed a postural grading as follows: Correct posture, 7 per cent; fairly good, 13 per cent; poor, 60 per cent; very poor, 20 per cent.

Because of the high physical standard and the very careful and thorough physical examination which the cadets must undergo before entering the United States Naval Academy, midshipmen who present very grave postural defects are rarely seen. On the other hand,

the slight deviations from normal are readily picked out and carefully treated, for the aim of the institution is to produce an uniformly high-grade product. Our findings may be slightly higher than usual, for our observations are made from more angles than are generally used. We make three views—anterior, posterior, and lateral—of each midshipman. There are, therefore, many points of variations from a vertical line extending from the mediotarsal region through the thigh and passing along the middle of the posturegraph. The variations from this line may be in the body as a whole, or they may occur in the head, shoulders, chest, abdomen, back, hips, or knees. In the anterior view they show as right or left variations from a vertical line extending from the midpoint between the heels along the middle of the posturegraph board. These errors may occur in the body as a whole or may be shown as tilts of the head, shoulders, or hips by a horizontal line drawn at right angles to the vertical line. By using these lines on the posterior view, the constancy of these tilts shown in the anterior view may be noted and the position and the extent of lateral curvatures may be seen.

As soon as a midshipman sees his picture thus displayed he can enumerate his defects, and after the cause has been explained he is more than anxious to correct the fault.

The number who, at first, are able to fulfill the requirements is very small. Even in this carefully selected group of young men not more than 1.7 per cent in the class of 1929 failed to present some postural defects. As yet a reexamination by posturegraph of this class has not been possible, but, from an examination of various sections by the use of the posturegraph board, a very noticeable improvement appears to have been made by those having defects.

The defects most commonly noted are abdomen forward, shoulders round, chest flat, and head forward.

The head is carried to the right more frequently than to the left, and only rarely backward. The right shoulder is most often found to be forward and low; the right hip high, or both hips forward. The body is tilted to the left from the hips and ankles, and backward from the knees. The most frequent curve is in the midback, with the convexity to the left. Lordosis is rarely seen.

From the information gained from the posturegraph, the strength test, and the practical gymnasium test we have the necessary data at hand to outline the exercises to be followed in an endeavor to produce a well-rounded, physically fit midshipman.

Those who present the greatest number of postural defects are usually the ones who are found to be lacking in general strength and who are unable to pass the gymnasium test. These men are usually of the carnivorous type, with long slender bodies and light

musculature. Doctor Kellogg (14) speaks of this association between poor posture and poor strength in this way:

"Another study which I began many years ago (1883) was the testing of various groups of muscles of the body, including those of the trunk, and a comparative study of the results in men and women.

"These studies by means of the universal dynamometer, which I devised for the purpose, brought out in a very strong light the fact that in persons whose posture is habitually bad the three great groups of trunk muscles, posterior and lateral, are disproportionately weak."

Lieut. E. B. Taylor, Medical Corps, United States Navy (17), says:

"There are examples without number of officers of to-day's Navy who have graduated from the academy in years gone by who are in better physical condition than could be expected for their age and service. The secret of this lies in the fact the Government requires that its officers and men keep physically fit at all times; and when they enter active service they do not settle down to a soft, sedentary existence, but undertake measures regularly for the upkeep of their physical condition. As a check up on this, every officer is given a thorough physical examination once a year. During the year preceding this examination he is required to take daily exercise of at least one-half hour. Defects, then, would, under this system, be certain to crop out, and weakness would appear if present. All midshipmen are given an annual physical examination, and those who fail to come up to the required standards are recommended for rejection. In support of the above statements, a careful anthropometric study of officers of the Navy Post Graduate School who had varying amount of service was made by Lieut. S. B. Solhaug, Medical Corps, United States Navy. These officers he divided into two groups—first, those who were recent graduates of the academy; and, second, those who had five years' active duty. The second group showed a greater percentage of defects than the first, particularly in the dorsal, abdominal, and femoral groups of muscles. This furnishes convincing proof of the necessity of requiring officers and men to keep up their physical condition."

By exercise we aim to tone up and educate to proper action the entire musculature of the body. At the same time special attention is given to those muscles which are most important in holding the erect position. These are the abdominal muscles, the muscles of the shoulder girdle, and the gluteal muscles.

During the next academic year we shall add two new features to our posture work. One will be the use of full-length mirrors, so placed about the posturegraph board that the subject, when standing upon the pedestal, can see himself in each of the three positions. In this way the instructors can point out defects and coach the subject

in corrections so that he can better see and feel the position of correct posture. The second feature is the taking of posturegraphs with the motion-picture camera. By means of a device developed by one of the young naval officers it is possible to take one exposure at a time. In this way the three views of each man can be taken in sequence and an entire class can be taken on one reel. By using a frame similar to that which Doctor Brackett uses and setting it between the camera and the subject, the necessity of drawing the vertical and horizontal lines will be eliminated. With the projection apparatus the picture can be seen in life size upon a screen, or an enlarged photograph can be made—1 to 10—for the midshipman's personal use, and reexamination will be made much simpler.

We strive to produce the type of young man which Doctor Fisher has described in the *American Physical Educational Review*:

"The new physical training should produce the following type of man: Slender in type, graceful, and not heavy muscularly, clear eyed, fair skinned, supple but not tense, alert, erect, easy on feet, enthusiastic, happy, forceful, imaginative, self-controlled, true, clean, with a sense of fair play, who loves the companionship of his fellows, and who has the fear of God in his heart."

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MEDICAL TACTICS IN NAVAL WARFARE—CONTINUED

PART III—CONTINUED

MEDICAL TACTICS OF JOINT ARMY AND NAVY OPERATIONS

By W. L. MANN, Commander, Medical Corps, United States Navy, and Maj. A. D. TUTTLE,
Medical Corps, United States Army

INTRODUCTION

It seems to be a well-established fact that modern wars are partaking more and more of a joint amphibious character and that this type of operation is assuming increasing strategical importance. From the standpoint of Great Britain and the United States the World War was almost entirely a joint campaign of an amphibious nature—every soldier of these two nations entering combat having been transferred “across water.”

In joint operations the Navy assumes responsibility for the safe transportation of all matériel and personnel to and from the theater of operations, which arrangement places all troops and patients while en route directly under the supervision of the Naval Medical Service. In case the expedition is wholly under the control of the War Department, hospital ships, cargo ships, and troop vessels will be similarly operated by the Quartermaster Corps of the Army. Many of the subsequent remarks on the relationship of the medical department afloat to the medical department ashore will be equally applicable to such conditions where the land forces and the sea transportation come within the exclusive jurisdiction of the War Department—or the Navy Department in case of a Marine Corps expedition. In joint operations the responsibilities of the Navy begin at the gang-plank. As regards embarkation, the responsibilities and duties of the military authorities are fully set forth in detail in existing Army Regulations of the 30 series.

The Military Establishment prescribes a definite organization for each port of embarkation and an adequate staff and all the facilities necessary to accomplish embarkation in a methodical and expeditious manner. Each port commander has on his staff a medical officer under the title of “port surgeon,” whose duties it is to coordinate all the work of the medical department of the Army within the jurisdiction of the port commander. To a certain extent the eventual success of the troops being embarked on a given mission depends upon the care and attention to detail exercised by both the military and naval authorities at the port of embarkation.

The World War seems to have been no exception in illustrating the perpetuation of former errors in the transport of troops and matériel for expeditionary forces so prevalent in previous wars.

In the Gallipoli campaign an entire division arrived at the front (Mudros) with its troops scattered helter-skelter throughout the various ships of the transport fleet. Evidently no attempt had been made to adjust the distribution of units to the requirements of the landing operations, and their vitally essential matériel was likewise scattered to the four winds, so to speak. Upon arrival in the theater the division commander promptly recognized that he was not prepared to conduct the operations for which his division had been dispatched and requested permission to disembark and reembark in order to reorganize and get his equipment lined up before proceeding further on his tactical mission.

For the American Expeditionary Forces in France ambulance bodies were shipped in one bottom destined for a certain port and the chassis belonging to them in another ship for a far-distant port. We can go back to the Spanish-American War for another glaring example of this lack of military foresight. To obviate in future wars a repetition of these conditions, of which past history is so replete, we should not stop with the preparation of manuals, treatises, and whatnot telling our governing authorities just what to do, but should get out a little military decalogue containing a few of the most important "dont's" to be observed on the part of all those responsible for the embarkation of troops and matériel, and place them not only in the hands of the principal military and naval authorities but down to the lowest dockman concerned in the loading of ships. As regards Medical Department field equipment, this should be loaded on ships with the units to which it pertains, in the reverse order in which it is to be needed, so as to assure that the first units out with the disembarking troops may have at hand the equipment necessary in putting over their jobs. Our immediate concern in all landing operations is the immediate availability of equipment for the aid stations and medical regiment formations. In the medical regiment the order in which this equipment should go out of the hold or off the decks is: Collecting station, ambulance station, and hospital station. Behind these, in the transport fleet, we must have the personnel and equipment of the evacuation hospitals, and if it be contemplated in the plans to establish a base on shore after the troops have sufficiently advanced, the requisite general hospital personnel and equipment.

Tactical authorities are prone to discount probable losses and should be put in a frame of mind to meet more than halfway the estimates of the chief surgeon of the forces as to the number of casualties to be handled. If the enemy has had an opportunity properly to prepare for the reception of the invading forces, a loss of 50 per cent of the landing parties must be accepted with equanimity.

With at hand a reasonable estimate of the probable losses among the troops being embarked, the matter of properly distributing the medical personnel and equipment throughout the various ships of the transport fleet merits more than passing consideration. If morale in the face of great losses at a very critical period of the combat operations is to be properly sustained, the Medical Department dispositions assume an importance second to none. The proper preparation of embarkation schedules will eliminate many of the errors of the past. It is scarcely to be expected that any errors overlooked can be corrected after embarkation has actually been accomplished.

AT PORTS OF EMBARKATION

The sanitary regulation of troop transports operating under the control of the Navy has been a subject receiving the attention of the sanitarians for some time. Gihon devotes a chapter to this subject and relates the deplorable sanitary conditions on the transports bringing the three months' volunteers from New York to Annapolis in April, 1861. The following remarks on sanitary requirements are based upon the experiences of various Army and Navy medical officers in the World War—Noble, Fiske, Snyder, Murphy, Heiner, etc.

Structural alterations of individual ships, converted from the merchant marine, as to the arrangement of troop and officers' quarters, messing facilities, ventilation, lavatories, and water supply will vary, manifestly, with the type of the vessel, yet, as a general rule, the accepted sanitary standards, as herein outlined, should be adhered to as closely as practicable before permitting troops to embark. This is primarily a responsibility of the Navy, but the views and recommendations of the military port commander should always be carefully considered when variations from the normal become necessary. But such should conform to the general specifications, issued by the Navy Department, covering these alterations and installations. The medical aide to the commandant of the naval district or the medical officer assigned as aide to the supervisor of naval transportation will inspect and make necessary recommendations to insure the sanitary condition of these vessels and their conformity to the adopted sanitary standard. A close liaison and frequent conferences with the port surgeon would prove mutually beneficial in securing joint Army and Navy cooperation.

The troop-carrying capacity of a ship can be made on the basis, for small ships, of 5 tons gross displacement for every man transported; on a large vessel allow 4 tons.

The sick-bay accommodations should be computed on the basis of 2 per cent of the total number of crew and troops carried, with 1 per cent extra for isolation facilities.

In order to obtain the necessary natural light and ventilation, experience has shown that the most desirable location of the sick bay is the central or after part of the superstructure.

Messing arrangement:

- (1) Cafeteria messing system.
- (2) Steam-heated dishwashing receptacles.
- (3) Allow 5–8 feet of range surface per 100 troops.
- (4) Two quarts ship's coffee per man.
- (5) Storeroom and cold-storage spaces for 4 pounds per man per day.

Lavatories and toilet requirements:

- (1) One shower for every 75 men.
- (2) One toilet seat (22-inch) for every 30 men.
- (3) For crew, the above ratios are 1–50 and 1–20, respectively.
- (4) Provide 7 hand basins for every 100 men.
- (5) One night urinal (sanitary can) for troop spaces for every 150 men.

Water supply:

- (1) Minimum allowance, 5 gallons per passenger per day.
- (2) Ten gallons for each member of the crew per day.
- (3) Fifteen gallons daily for each.
- (4) Scuttlebutt with three drinking spigots and one spigot for filling canteens.
- (5) One scuttlebutt per 100 men, or one spigot for every 350 men.
- (6) Salt water furnished for bathing and washing clothes, except in sick bay.

Ventilation, artificial and natural, standards:

- (1) Two thousand cubic feet of air per hour per man.
- (2) To secure this, for natural ventilation, allow 3 square inches of ventilation discharge area for each man in upper compartments and 3.4 square inches per man in lower compartments.
- (3) Install the supply system of ventilation in all compartments except "heads" and isolation ward, which should have exhaust.
- (4) Louvers should not discharge directly over a bunk.
- (5) The minimum acceptable allowance of cubic space is 70 cubic feet per man; in Tropics, 120 cubic feet per man.

Medical personnel allowance:

- (1) Three medical officers for 2,000 troops, one extra for each additional 1,000 embarked.
- (2) Six hospital corpsmen for 24 sick-bay beds, 10 for 50 beds, or 15 for 100 beds.

In the event that the requirements of the Hague Convention are not respected by one of the belligerents, or if for any other reason hospital ships are not utilized to repatriate the sick and wounded of an overseas force, the only alternative is the employment of the returning troop transports in this capacity.

If these conditions of using troop ships for medical purposes obtain, such arrangements should be regarded as makeshifts only, and must be avoided, in our judgment, whenever practicable. However, it is considered wise to outline some of the sanitary requirements of transports functioning in lieu of hospital ships. Vessels so operated should have a fully equipped operating room, dental office, dispensary, examining room, diet kitchen, laboratory, isolation ward, medical storeroom, locked ward for insane, disinfection room, toilet and baths adjoining sick spaces. A pus operating room and a room for venereal prophylaxis and treatment are desirable. The ward space should have 50 to 175 beds. Separation of patients in small spaces should be avoided, as this requires larger hospital corps personnel.

The total patient capacity of troop ships—that is, the total number of sick and wounded—should not exceed two-thirds of the normal troop capacity. Accommodations for the insane are limited to one-eighth of 1 per cent of the total patient capacity. An allotted space fitted with heavy wire screen can be used for the nonviolent insane. A locked ward must be used for the violent cases. Accommodations for the care of tuberculous cases in isolation or on upper deck should not exceed one-half of 1 per cent of the total patient capacity. Ambulant medical and surgical cases, including crutch cases, needing attention can be assigned to standees in troop space convenient to sick bay.

A type of standee bunk that has been found to be most satisfactory consists of a single steel upright $1\frac{1}{2}$ inches in diameter to which, at either end, the pipe-frame cot with woven wire bottom is suspended by hooks and chains. This bunk can be triced up when not in use, allowing access for cleaning and wider passage. The dimensions are: Length, 80 inches; width, $25\frac{3}{4}$ inches. The space between bunks should be: Lower, 26 inches; middle, 20 inches; top, 20 inches; width of aisle, 21 inches. In the spacing of the bunks the lower should be at least 6 inches clear of the deck when occupied by a soldier with equipment. His pack furnishes his bed, and the rifle is stored in a sack at the foot of the standee. Hammock mattresses in sufficient number should be provided for returning sick and wounded.

IN THE TRANSPORTATION ZONE

The transportation zone at sea is a naval term used similarly to the communications zone in land warfare. It extends from the coastal

zone to the fleet zone, that is, the theater of operations. In a joint overseas campaign the Naval Transportation Service operates all troop transports, supply ships, hospital vessels, and other auxiliaries used for the supply of the Army and Navy forces in the fleet zone or the theater of operations. The medical authority of the ship surgeon over troops or patients commences immediately after they are embarked and checked by representatives of the Army and Navy, and this authority ceases only when they are debarked and checked ashore by the above officials.

JOINT LANDING OPERATIONS

The combined activities of the land and sea forces have played a conspicuous rôle in the history of war down through the ages. The landing of 12,000 Federal troops at Port Royal was one of the largest joint landing operations during the American Civil War. With reference to the Spanish-American War, Rear Admiral Pludemann pointed out that the landing of the American forces at Daiquiri, Cuba, was the largest which had been effected up to that time (1898) since the operations of the western powers at Balaklava in the Crimean War (1854). In this landing, for the investment of Santiago de Cuba, 15,000 men were successfully disembarked from 53 vessels. The landing was made in good weather and without opposition; yet, in spite of all these favorable influences, the landing was not accomplished without considerable confusion attributable largely to the fact that no one in authority had been appointed in charge of the landing place. The Army Medical Department contingent of the Fifth Army Corps was composed of highly trained and efficient personnel, well equipped, yet "faulty landing methods" rendered valueless much of their preparation for active service in Cuba. All medical transportation, excepting a few ambulances, was left on board, and part of the medical supplies was not landed in time to treat the wounded in the battles of El Caney and San Juan. The few medical chests that came ashore with the troops were transferred to the troops by "litter bearer carry." (Report of the Surgeon General, U. S. Army.)

The first book on the tactics of landing operations has yet to be written, notwithstanding the great importance that this branch of tactics assumed in the World War and the recognition since accorded it in the various service schools. Since the medical tactics connected with this type of military activity must conform and harmonize with the ideas of combatant branches, and practically no literature is available, we have been compelled to follow closely, in the preparation of this study, the views as outlined to us in informal conversations and discussions with the officers of the Army and Navy who have devoted considerable thought to landing tactics.

In order that the reader may visualize some of the salient conditions under which landing operations are conducted, a brief description seems appropriate. The fleet with its convoy of transports arrives opposite its destination. The troop transports for the first three or four waves of troops to be landed take up their position and anchor opposite the landing beaches at a distance of about 3 miles offshore. Transports carrying succeeding waves of troops arrive at positions as required by the debarkation tables. If possible, these anchorages are veiled by laying a suitable smoke screen, and all precautions are taken by the fleet to protect them from enemy raids on the part of submarines or airplanes.

At the appointed hour the troops begin to disembark in the small boats accompanying the fleet and transports, and artillery preparation on the part of the fleet is commenced. Heavy concentration fire is directed on the landing beaches and vicinity for about 30 minutes preceding the time when the troops are expected to reach the beach. This fire is lifted in advance of the progress of the troops, and back areas are covered continuously until the landing force obtains a foothold on the beach, fire objectives being changed as called for by the landing parties from time to time. Interdiction fire and counter-battery work on the part of the guns from the fleet is practically incessant throughout the landing operations.

Only small arms and 1-pounders are with the troops belonging to the first waves. The 75s and howitzers are landed later. Now, if the enemy has had any opportunity to prepare his defense, the situation confronting the troops approaching the shore in small boats is pregnant with difficulties. The enemy has probably sown the beaches and for some distance out into the water with obstacles, such as barbed wire, etc. He may have strewn the areas with gases, such as phosphorus and mustard. The approaches are probably covered by well-manned trenches, with machine-gun emplacements and 75s in particularly advantageous defensive positions in support of the troops equipped with small arms.

The enemy may also have available in the back areas howitzers which can cover not only the beaches but all ravines, gullies, etc., in their vicinity. Even under the protection of night or a smoke screen, the boats, as they approach the beach with the landing troops, are subjected to a murderous fire on the part of the enemy, and the maximum losses will usually be sustained before the troops gain a foothold on the beach. Even after the first wave is landed the enemy will probably be on the alert and launch a counterattack, with a view to driving in the beach heads, crushing penetrations, and preventing consolidation of the position gained by the landing forces. Such tactics result in unusually large losses, and in estimating the probable number of casualties to be handled 50 per cent is not

without the bounds of reason. As these casualties begin to accrue immediately, along with the military forces there should be landed with the first wave a beach and shore party from the Navy and such staff officers of the Navy, with adequate assistants, as are to be designated as beach masters in handling the small boats at the beach.

Fortunately, a study of the joint landing operation on the Gallipoli beaches furnishes a modern basis for establishing the fundamental principles underlying the medical tactics of this phase of amphibious campaigns. The magnitude of the landing force, the strength of the opposition, the simultaneous employment of the Army and Navy, the comparatively limited landing area, and many other factors go to make the record of this struggle a most interesting and profitable source to utilize in formulating medical plans for joint landings.

Herein an endeavor has been made to outline the general principles underlying the medical arrangements of landing operations of the Army and Navy as a preliminary procedure for further development. Care must be taken in the interpretation and application of all principles, since some of even the firmly established ones are not adapted, necessarily, to all of the various combinations of special military situations which may arise. "Principles apply only when they apply," as expressed by one of the War College's epigrams.

It is believed, however, that the fundamentals herein laid down for consideration will be applicable to the majority of the military situations which are likely to be met. They will be presented along with citations of certain historical parallels of the medical phases of joint-landing operations.

It is most striking how "history repeats itself." The conditions at the Dardanelles, where wounded soldiers were crowded aboard hospital transports and suffered from the lack of medical attention, partially due to the failure of the Army and Navy medical departments to cooperate properly, were similar to the circumstances prevailing off Carthage nearly two centuries ago. Smollett writes of the latter campaign that the wounded soldiers from ashore were "squeezed" into hospital transports, with scarcely space to sit upright in their bunks, their wounds being infested with millions of maggots:

This inhuman disregard was imputed to the scarcity of surgeons; though it is well known that every great ship in the fleet could have spared one at least for this duty, an expedient which would have been more than sufficient to remove this shocking inconvenience.

But, perhaps, the general was too much of a gentleman to ask a favor of this kind from his fellow chief, who, on the other hand, would not derogate

so much from his own dignity as to offer such assistance unasked, for I may venture to affirm that by this time the demon of discord, with her sooty wings, had breathed her influence upon our counsels, and it might be said of these great men (I hope they will pardon the comparison), as of Cæsar and Pompey, the one could not brook a superior and the other was impatient of an equal; so that between the pride of one and insolence of another the enterprise miscarried.

Now compare the foregoing conditions attributed to the lack of coordination of the Army and Navy medical services to those below as given by Lord Webster-Weymss, an admiral of the fleet during the World War. His description shows that at least the modern admiral made an attempt to remedy the situation, yet the cooperation between the medical forces afloat and ashore was not quite so complete as the wounded would have liked to see it.

As a result of the failure of the army to advance more than a few hundred yards after landing, the establishment of field hospitals on the peninsula was out of the question, creating almost insurmountable difficulties in attending to the wounded before they were sent back for embarkation. The condition of the wounded, therefore, when they arrived on the beaches was pitiful and their numbers far greater than could properly be dealt with. Every available boat was requisitioned for taking them off to the hospital ships, quickly filled to overflowing. The men of war took on board all that they could deal with and still there were many who could find no asylum. Boats full of suffering men went from ship to ship seeking accommodation that could not be found, and though empty transports were used to shelter them they had neither doctors nor medical equipment. Seeing how matters stood, I made an offer to Surgeon General Birrell, the director of medical services, of as many naval surgeons as could be spared from the fleet, with the necessary proviso that he must be prepared to allow them to return to their ships immediately, should the necessity arise, for at that time there was no foreseeing what duties the men of war might be called upon quickly to undertake.

I was a good deal shocked when my offer was refused, on account, as the surgeon general explained, of the attached condition making it impossible for him to find suitable work for them to do. I was unable to acquiesce in his refusal and went personally to see Sir Ian Hamilton, at that time afloat in the *Arcadian*, to protest against the refusal to make use of available help. My protest had the desired effect; some 14 naval surgeons were distributed amongst the doctorless ships, thus at least temporarily filling a void. (Wemyss.)

No finer pen picture of the medical situation afloat during the early stages of the landing at Gallipoli can be found in the literature than that of Bean. It is replete with lessons to be learned. It points out the things we should strive to avoid in the future. It is a cry for better staff work, for better teamwork, for better planning, coordination, and cooperation on the part of the Army and Navy when engaged in joint operations. A recital of the terrible conditions is worth quoting at length, since it portrays a scene with which the medical department of the Army or Navy, or both jointly, may be confronted in the future.

In consequence of the tardiness of all the medical arrangements of general headquarters, neither Howse nor Manders ever received the final medical plans of Hamilton's staff.

What happened may be thus described. It will be remembered that the administrative staff of general headquarters was left in Egypt until the last moment, and that the general staff assumed the responsibility of drawing plans which provided one hospital ship and two transports for the evacuation of all the wounded from Gaba Tepe. At the eleventh hour, on the arrival of the administrative staff, these inadequate plans were altered, the provision being practically doubled, and one hospital ship and four transports allotted to Gaba Tepe. In order to fit the additional transports for taking wounded, the Second Australian Stationary Hospital and Sixteenth (British) Stationary Hospital, with their equipment and medical officers and a depot of medical stores were hurriedly ordered to leave Egypt at once for Lemnos. On April 20 these embarked at Alexandria in the *Hindoo*.

Had the landing taken place at the date then intended, April 23, even the hospital ship *Gascon* would barely have arrived in time, much less the *Hindoo*, with staff and fittings for the transports. The weather caused a postponement for two days. The *Hindoo* arrived at Lemnos on the 24th. She carried 3 doctors, orderlies, equipment, and stores for the transport *Lutzow*, the same for the *Ionian*, 1 doctor with orderlies and equipment for the *Clan Macgillivray*, and 15 orderlies for the *Seang Choon*. But all these transports except the *Seang Choon* had sailed. The *Hindoo* transferred her orderlies to this ship, and the assistant director of medical services ordered Major Barber, of the Second Australian Stationary Hospital, to stand fast and await further orders from the vice admiral.

The *Hindoo* even at this late hour would have been in time to transfer her doctors and equipment to the allotted transports had arrangements been made for her to do so. But while Sir Ian Hamilton's general staff sailed with him in the *Queen Elizabeth*, capable of hurrying at high speed wherever the desire of the moment impelled them, his administrative staff was relegated to the *Arcadian*, where they had not even the right, except as an act of grace on the part of the ship's authorities, to send wireless messages. The *Hindoo* during the whole day of the landing lay at Lemnos. That night she was ordered to Cape Helles. At Helles she again lay idle for four days, with the personnel and equipment for two hospitals on board and not one wounded man. Hamilton's administrative staff, cooped up in the *Arcadian* close beside her, did not know until some time on April 29 where the *Hindoo* was. They had been informed that the general staff would be responsible for carrying out the plans. On April 29 an urgent appeal came from Colonel Manders stating that he was short of dressings, and at last on that day the *Hindoo* was found and ordered to Gaba Tepe. The *Seang Choon*, *Clan Macgillivray*, and other ships had then left, crowded with wounded, for Alexandria; the Second Australian Stationary Hospital transferred itself to the *Gloucester Castle* and *Devanha*, which filled immediately and sailed with 791 and 432 cases, respectively.

In the meantime the merchant captains, stewards, and odd sailors in the transports had for four days endeavored as best they could, with such knowledge and materials as they possessed, to render their septic and crowded steamers fit to receive the barge loads of wounded which arrived alongside, sometimes before the ships had emptied their troops. Two of the transports earmarked for wounded, the *Seang Choon* and the *Clan Macgillivray*, had temporarily received certain medical officers from the field ambulances; the rest were quite unequipped. One of these specially chosen, the *Lutzow*, had still

160 horses on board, and the veterinary surgeon is said to have been the sole medical officer for her 300 patients until a naval doctor was sent to help him on April 26. Other transports had hurriedly to prepare for wounded. The *City of Benares* was one—she had just cleared a cargo of mules. Captain Burt, in the *Galeka*, was informed that he would be required to receive wounded and was asked how many he could take. With his chief steward he calculated the number of beds and replied 160. The ship's doctor began to prepare for that number. The salon had been cleared for an operating theater, when it was heard that from 600 to 700 wounded men were coming aboard that afternoon. The same evening Maj. H. N. Butler, of the Third Australian Field Ambulance, boarded the *Galeka* with part of the ambulance staff, who did what they could for the crowded men, Major Butler dressing and operating for 36 hours continuously. Colonel Ryan, at Birdwood's request, went around the ships, inspecting, operating, doing what he could without materials, and finally sailed in another badly understaffed ship, the *Dunluce Castle*, in which from four to a dozen men died every day until Alexandria was reached.

During this time Colonel Manders, at Anzac, had sent four pressing messages to Hamilton's medical staff, stating that the ships were filling up and asking which transport was to receive the additional wounded. But General Birrell, cooped up in the *Arcadian*, never received these telegrams. Birrell knew that he was completely cut off from his work and unable to fulfill any part of his duty of supervision. On the 27th he asked that either he or his assistant might be allowed to join Hamilton's staff in the *Queen Elizabeth* in order to supervise the clearing of the wounded, which he realized was not being carried out as intended. General headquarters replied that the general staff was making all arrangements for the evacuation and reception of wounded in accordance with his plans.

The sufferings of these wounded men were great. It might naturally have been expected that the worst discomforts would have ended with the journey down the hillsides. On the contrary, the worst began when they left the beach. Many spoke of it afterwards as a nightmare. The row through the dark seemed interminable—the ships had been moved farther out after the heavy shells fell near them in the morning. Barges crowded with wounded were hauled around in the dark from one transport to another until they found one not already overcrowded. The stream of casualties was so constant that transports which were receiving lightly wounded men up the gangways sometimes failed to notice the seriously hurt who lay in barges beside the ships. Beside the *Seang Choon* one barge lay from 6 till 11.30 p. m., open to the chilling rain, in a choppy sea, bumping into the ship's side, butted by the launch next to it. There were men in it with arms smashed to pulp, men broken in every part of their bodies. The bumping of the barge was punctuated with curses, moaning, the sighs of men praying to die. For half of them seasickness was added to their other miseries. A seaman's head would appear over the ship's rail high above and disappear again; but the barge might have been there till morning had not a wounded officer written to the authorities aboard, saying that he was a personal friend of General Birdwood and threatening an inquiry. Another boatload of wounded, which lay beside the *Derfflinger* at dawn, was overturned by the moving of the transport to draw clear of the big shells from Chanak. Lieutenant Boase, of the Ninth Battalion, was in this boat. Though everyone in it was thrown into the water, all but two were saved.

Aboard the improvised "hospital carriers" conditions existed which may scarcely be described. The *Clan Macgillivray* and the *Seang Choon* were probably the best staffed of the original transports. Yet the *Clan Macgillivray*

carried 850 wounded, with only two doctors, and the *Seang Choon*, packed in every space with from 600 to 800 wounded, had only three. The broken men were lucky if they had a hard table to lie on for the next four days, with life belts for pillows. The endless stamping of horses in the *Lutzow* prevented sleep. The *Derfflinger*, despite the protest of Major Millard that she was overcrowded, took 590 cases and sailed with three doctors to Alexandria. By the second day at sea 30 men had died aboard her. In the *Mashobra* many of the wounded had no blankets and no food. In some ships there were no conveniences at all, and newspapers had to serve for utensils of health and cleanliness. In the *Lutzow* not even paper was obtainable, and there were only four bedpans—stolen from another ship—for nearly 800 patients.

It is only by degrees, as the wounded returned to the front, that the failure of the medical arrangements on the lines of communication became known to the fighting troops. This, together with the apparent bungling of medical boards in Egypt, the difficulty which men who thought themselves restored to health found in being allowed to return to the front, the endless delays and counterorders in the transshipping of drafts at Lemnos, and the far too obvious comfort of the lines of communication staff in the mail steamer *Aragon* at Mudros, gave the front-line troops a contempt for higher staffs which was not entirely deserved but which lasted until the battle of Messines in 1917. In one important respect, however, the British staff never forfeited the trust of its armies. The provision of food never failed. Even during the first days after the landing the troops were never short of it. A craving for cigarettes, of which several precious sacks were sent ashore by the men of the navy, and for news from outside, the place of which was filled by rumors "from the beach," were two of the symptoms which marked the strain of the early days.

The British commission appointed under the special commission (Dardanelles and Mesopotamia) October, 1916, concludes, after an exhaustive inquiry, that "the medical side of the campaign does not seem to have ever been thoroughly thought out. The treatment of the wounded ashore on the peninsula appears to have been as satisfactory as circumstances would permit, but in the transport of men to the ships and overseas many of the complaints were justifiable."

One of the primary purposes of the authors in the preparation of this section is to define specifically the duties of our respective medical services when operating in a joint action, in the hope that this study will prevent, to some extent, the chaotic conditions described and assure the formulation and adoption of proper medical plans. It should be quite manifest that our task of arriving at common and mutually satisfactory agreements relative to the specific function of the Army's and Navy's medical services in a joint landing operation will be greatly facilitated by access to voluminous data and by ample time for discussion and deliberation of debatable points, should any arise.

A clear definition and understanding of the respective responsibilities of the Medical Department of the Army and of the Navy is absolutely essential in preventing unnecessary suffering of the

wounded and actual impairment of the efficiency of the fighting forces.

We are emphatic in the conclusion that the Navy Medical Department must assume all responsibility for providing provision afloat for the wounded until such time as the Army Medical Department can get firmly established ashore. It may be stated, however, that the Army medical personnel which has not landed shall be considered as available for duty in caring for the early accumulation of casualties. Such arrangement actually occurred at Gallipoli; certain portions of the field ambulances and the stationary hospitals served on the troop transports and helped convert these into temporary hospital ships. The No. 2 Australian Stationary Hospital remained on duty afloat for nearly six weeks.

The authors offer for consideration below what they believe to be the basic principles that should govern the medical services of the Army and Navy in joint landing operations.

JOINT ACTIVITIES AFLOAT

While en route.—If the plans have been properly drawn, it is presumed that the medical services of the Army and Navy aboard, both as regards personnel and equipment, are adequate for the designated mission, and are organized into the numbers and kinds of units required by any well-balanced force; that the Medical Department units, with their essential equipment, have been properly distributed throughout the various vessels of the convoy. If not before, certainly while the vessels are en route, the senior medical officer (surgeon) of the Army and of the Navy contingents should be made fully acquainted with all the details of the plan to be put into effect upon arrival at the given destination. This means that they must have participated in all staff conferences. As a final preliminary to the execution of the landing project they should have a personal conference, as the representatives of their respective commanders, and go over and discuss seriatim all the details connected with the medical dispositions to be made during the forthcoming attack. They should particularly discuss the divided responsibilities of each medical service and the reciprocity to be put into effect to assure whole-hearted and efficient cooperation on the part of both in accomplishing a common mission.

Although a matter in which the Medical Department has but little voice, it is to be hoped that the higher command would recognize the wisdom of embarking the general headquarters staffs on one vessel and, even after the anchorage is reached, to continue such official association until the landing has been completed. This would greatly facilitate the frequent staff conferences so necessary in operations of

this character and the speedy dissemination of important information so constantly being received. If the staff is scattered throughout the various vessels, satisfactory communication becomes extremely difficult.

The Army and the Navy surgeon should each nominate as an evacuation officer on his staff a medical officer, with such assistants as may be necessary, whose sole duty during the landing operations will be that of coordinating and tallying all casualties evacuated and keeping his chief and the General Staff informed as to the status of this phase of medical service operations. The evacuation officer on the staff of the fleet surgeon should compile and have ready in advance a detailed bed board exhibiting the patient capacity of and class of patients to be accommodated on each ship and totalizing the result for the entire convoy. It must be remembered that during the landing operations this naval evacuation officer officiates in a capacity analagous to that of an evacuation officer on the staff of an Army surgeon when routing casualties to evacuation hospitals.

In this naval instance the beach head corresponds to the hospital stations, the small boats plying between the shore and ships to the ambulance companies, and the vessels to the evacuation hospitals employed by the Army in its scheme of evacuation. Without his tally board of the bed status, or, more properly speaking, the patient status, he would always be in the dark with reference to the patient situation throughout the vessels at anchorage. He should be authorized to call upon all vessels receiving patients to render patient status reports at frequent intervals during the landing operations, even hourly if he considers such course necessary.

Upon Navy officials should be urged the necessity of authorizing signal communications on a preferential priority between the medical representatives on the various ships in order that the casualty statistics may be kept up to the moment and all evacuation activities adjusted thereto. It is absolutely essential that the naval evacuation officer know the number and type of casualties received by each ship. Without these data and checking them against his tally board he can not arrange properly for the secondary evacuations of patients from ship to ship which sooner or later will become necessary.

In addition to enjoying prompt signal facilities arrangements should be made also to provide him and his assistants with speedy motor boats in order that he may whenever required visit any vessel at anchorage, and also in emergencies intercept outcoming small boats carrying casualties and give them a proper destination.

There are many other items to be discussed and decided by the surgeons of the Army and Navy and approved by the staff prior to arrival at anchorage—the patient capacity of each ship, the kinds of cases it is to receive and temporarily care for during the landing

operations, the sufficiency of the medical supplies aboard for the patient load to be accommodated. If additional supplies are needed, the kinds and quantities, the source from which they are to be obtained, and how and when they are to be sent aboard at anchorage. The sufficiency of the naval medical personnel aboard—and to remain aboard during the period of the landing operation—and if reinforcement is to be needed in order to care for the number of patients to be allotted to the ship, the number and character of such replacements, their source, and how and when to be sent aboard after arrival at anchorage. As regards reinforcements of this character, normally they should come from the Army medical units which occupy a low place on the deferred landing schedule, such as general or station hospitals, and in emergencies evacuation hospitals. The personnel of surgical hospitals should be listed as anchorage reinforcements only in case the general hospital and evacuation hospital personnel is insufficient to meet the need, as the occasion for the sudden dispatch ashore of a surgical hospital complete to care for nontransportables may arise at any moment.

The action to be taken should the losses exceed expectations and the patient capacity of the ships become overtaxed, and if this requires evacuation to the base, and the designation of ships for that purpose, the kind of cases to be separated from the force, are only some of the more important details to be discussed and worked out before the anchorage is reached. In principle the ones evacuated should be only those cases who cease to be potential assets from a military standpoint. The slightly wounded and all other patients who offer a prospect of early recovery should be retained at the anchorage and in due time become replacements for the combatant troops. Just as soon as conditions are favorable for the establishment of units for their care ashore this class of cases should be debarked and treated there.

At anchorage.—The debarkation schedule in general covers the landing of the Army medical contingents. Until the landing forces have accomplished their initial mission a considerable part of the Army contingent remains aboard the vessels at anchorage awaiting the time when they may also proceed ashore. The Army will not be in a position to give definitive treatment to its sick and wounded until such time as general hospitals can be established ashore. This means that during the interim the Navy medical service must maintain and be ready to provide, particularly in the early stages of any landing operations, supporting hospital facilities afloat to bridge this gap and give definitive treatment.

On this principle the Navy medical service afloat—at anchorage—becomes an important link in the chain of evacuation and temporarily the reservoir for the reception of all casualties. It virtually acts

in the same capacity as a group of Army evacuation hospitals or general hospitals until the Army can get such units established ashore.

Therefore the proper organization of the vessels at anchorage for the reception of patients necessitates considerable thought and attention to detail. The proper sorting (triage) and distribution of patients received from the beach head is a responsibility of the naval evacuation officer on the staff of the fleet surgeon.

In drawing up his plans for the temporary care of patients the fleet surgeon has already been in conference with the chief surgeon of the Army contingent and arranged with him for such assistance from Army units, remaining aboard, such as the personnel of evacuation and general hospitals, as may be necessary.

The initial operation is apt to result in a sudden and great accumulation of casualties, even to the extent of temporarily overwhelming the normal patient capacity of hospital ships, troop transports, and combatant ships. In emergencies, any ship should be considered as available for the reception of walking wounded. Their subsequent distribution can be effected as a result of the scheme of secondary evacuation adopted.

One or more hospital ships should be anchored close in to serve as a sorting hospital and a place for urgent surgical interference. As far as possible all of the seriously wounded should immediately be accommodated on hospital ships. The matter of dressing and temporarily caring for slightly wounded should offer no insuperable difficulties on any type of ship.

As toxic gases may be employed by the enemy along the water front, or mustard gas actually placed in the water through which the men must wade ashore, the Navy must be prepared to handle gas cases.

A special hospital ship may be designated for the treatment of this type of casualty, especially if they be severe. The Navy evacuation officer should receive timely reports of the number and kind of all casualties received by any ship. For this purpose he should keep a tally board up to the minute which will disclose at a glance the patient status throughout the entire fleet at anchorage.

In the stress of combat it is scarcely to be expected that there will ever be a sufficient number of small boats to guarantee that the wounded evacuated from the beach heads will always reach the vessel best equipped and suited for their care.

If the Navy man in charge of each boat has been properly instructed at the beach head in reporting the type of casualties he has aboard, sorting and distribution will be greatly facilitated.

If there is not a sufficient complement of naval hospital ships with the fleet to accommodate all the seriously wounded, a primary

sorting and distribution must be made at the anchorage. The naval evacuation officer should be given such assistants as may be necessary to accomplish the primary sorting before the small boats coming off from shore reach the anchorage. To this end they should be given speedy launches in which to ply immediately in front of the anchorage and hail all outcoming boats for the purpose of ascertaining the character of their load and indicating the vessel to which they must go. Without some such system, confusion and considerable unnecessary secondary evacuation will inevitably ensue.

By "secondary evacuations" we mean the transfer of patients from vessel to vessel at anchorage until the wounded have been properly distributed for the care and treatment best suited to their needs. The attention of the evacuation officer should be principally concentrated on the proper sorting and distribution of the seriously wounded, especially those requiring immediate operation.

Military necessity will render it almost impossible and, in fact, inexpedient for him to divert boats carrying slightly wounded. These should go direct to their ships and their loads should be taken aboard there and temporarily cared for until other arrangements, via the secondary evacuation system, can be made for their transfer to another vessel. The routing of the wounded must not be permitted to interfere with the expeditious landing of the troops.

The confusion existing in transferring the wounded from place to place under the excitement of the initial landing is well illustrated in the following incident related by Admiral Wemyss. If a wounded brigadier general is removed from the admiral's cabin and no one (in authority) notified—formally or informally—there is reason to assume the situation has reached the chaotic stage.

As many of the wounded as possible were brought on board to give relief to the hospital ships, and amongst others Brigadier General Hare, who was placed in my cabin. During the afternoon I snatched a minute to go down and see how he was getting on, and to my consternation discovered the cabin empty with only a few traces of blood, nobody had found time to remove, to show that he had been there. Nobody knew anything about him, and I was much concerned at his disparition and wondered whether he was still alive. It was only much later that I learned, greatly to my relief, that he had been taken off to a hospital ship without the knowledge of any of my people.

JOINT ACTIVITIES IN LANDING ARMY MEDICAL UNITS

Medical detachments must land with the combatant troops to which they are attached by tables of organization. In boarding the small boats, company aid men leave with the company to which they are assigned in action. The remainder of each battalion medical section embarks along with the last company of the battalion shoving off. The headquarters of the medical detachment accompanies the regimental headquarters. Whenever conditions will permit, the medical

personnel belonging to the aid station and litter-bearer squads should be placed, along with their aid-station equipment, in a small boat from which combatant troops have been excluded and which should fly at the bow the flag of the Geneva Convention.

It is considered inadvisable to attempt an equal distribution of medical detachment personnel throughout the boats so as to assure adequate first-aid treatment for the occupants who become casualties between the time they push off from the transport and land on the beach. The company aid men do partially meet this need. It is believed, however, that the aid-station and litter-bearer squads for each battalion should be kept in a group, as they will be needed immediately and urgently as a team the moment they reach the beach. As a factor of safety in meeting probable first-aid requirements afloat, at least one man of the Navy Medical Department should be assigned to permanent duty in each small boat, irrespective of the Army personnel aboard, since casualties among the Navy personnel operating such boats are likely to occur during the approach to the shore and the return journey to the anchorage. Furthermore, the Army men wounded while approaching the beach should remain aboard and will require attention on the return trip. Each medical section is responsible for unloading its aid-station equipment the moment the boat is beached. The equipment should be carried ashore loosely by hand, especially when going through the surf, as this precaution diminishes the danger from drowning in case of accident or casualty among the carriers.

The medical detachment should take in small boats its complete equipment, less transportation. The latter is subsequently sent ashore on the call of the commanding officer only when conditions at the front will permit its use. A special effort should be put forth to assure the speedy and safe landing of litters, splints, and blankets, and, in the face of an impending equipment loss, the recovery of those articles should be given salvaging priority. (The bearer division and a small portion of the tent division of a field ambulance landed with the covering force at Gallipoli. Each of the medical personnel carried ashore 100 pounds of medical equipment and supplies.)

Medical regiments should not be landed until the covering force is fairly well established ashore. During the early phase of the operations military necessity will usually demand all boats available for the transportation of combatants and munitions. While the landing force is gaining a foothold, the aid stations of combatant battalions remain practically on the beach. The landing of certain elements of the medical regiment should, however, be inaugurated prior to the time the evacuation of the seriously wounded from the shore is contemplated.

Normally the medical regiment components should be debarked in somewhat the following order: Collecting companies with essential equipment, shortly after the last medical detachment is cleared. Upon landing, the litter bearers from these collecting companies immediately begin to collect and sort the wounded, preparatory to their evacuation to the ships. They establish contact with the aid stations already in operation and, as the latter gradually advance, carry the wounded from them to the beach head. The collecting station section remains at the beach head and assists in the collection and sorting of casualties there until relieved by a hospital company. When sufficient terrain is cleared of the enemy the collecting companies advance, and then the hospital companies land and establish a hospital station at the beach head. Usually the ambulance companies will not be landed until word has been received from shore that conditions are such as to permit of their being used. Experiences in the landing at the Gallipoli beaches indicate that animal-drawn ambulances will be among the last to be unloaded on account of the difficulty in handling animals. Hence, in the earlier stages of landing activities hand and wheeled litter transport must be our main reliance, and just as soon as conditions become favorable for the use of ambulances those of the motor type should be landed first.

As the demand upon the medical personnel of the Navy will be heavy just as soon as evacuation from the beach to the ships starts, the personnel of these ambulance companies should be landed at the beach head to assist the medical debarkation officer in loading the casualties aboard the small boats and providing for their necessary supervision and care while en route to the ships. At the beach, at least two Medical Department men, well trained in first-aid methods, should be placed in each boat transporting wounded, to care for any emergencies that might arise en route. This need can be readily met during this period by the employment of the personnel of these ambulance companies. When required to make a trip to a ship it must be clearly understood by all concerned that they must promptly be returned to their proper station, the beach head, in order that they can be assembled promptly whenever their services as an ambulance company unit are needed. The service company, the veterinary company, and the regimental staff are usually the last elements of the medical regiment to land. Battalion staffs leave with the last company of their battalion. A representative of the regimental staff may be sent ashore in advance of his chief. The debarkation of the veterinary company should be deferred until an appreciable number of animals have been sent ashore.

When a division has been assigned two or more beaches a proportionate distribution of all the components of a medical regiment should be based upon the size of the force to be landed at each beach, or section of beach, and the relative amount of resistance and resultant casualties expected.

To recapitulate, dispatch collecting companies early. This personnel will render invaluable service on or in the immediate vicinity of the beach. The hospital companies may be retained aboard until the front has advanced a few miles or conditions are especially favorable and facilities exist for the establishment of a hospital station ashore.

Hospital units should be placed on a deferred schedule. Surgical hospitals and evacuation hospitals and such station and general hospitals as may form part of the convoy should remain aboard the transports until a survey of the conditions ashore warrants their debarkation and establishment. Ordinarily conditions will not be favorable for the employment of evacuation hospitals until a general advance has been effected. During the waiting period the personnel of hospital units should be employed aboard in supplementing and assisting Navy personnel in caring for the vast number of wounded being evacuated from the beach. The proper distribution of such personnel among the various ships is a matter requiring coordination and cooperation on the part of the senior surgeons of the Army and Navy present.

A few surgical hospitals should be held intact as an immediate reserve for service ashore, as the occasion for their employment alongside a hospital station at the beach head to care for nontransportable wounded may quickly arise.

At Gallipoli, No. 1 Australian casualty clearing station landed at 10 a. m. on the 25th of April, but the only site available was cramped and did not afford room for expansion.

At the time of the landing and during the critical days which followed there were only a portion of the field medical units and two casualty clearing stations with the divisions ashore, the remainder being assigned to duty afloat.

Landing the equipment of any type of Medical Department unit calls for the exercise of a lot of good judgment. The first consignment sent ashore should be restricted to the barest necessities and adapted to the conditions under which the personnel is to be required to work. Any equipment that can not be employed ashore on account of the limited space available should be held on board. Obviously, until the troops advance a considerable distance, all means of transportation would be useless. Tentage should be sent over the side piecemeal as needed. A bountiful supply of dressings, drugs, such as

morphine, litters, blankets, splints, and the ingredients for hot liquid food are primary requisites. Each unit debarking should leave behind a representative whose sole duty it will be to check off on a specially prepared list all the property of his unit as it goes ashore. He should remain aboard until the last item has been cleared. This will probably be a matter of days. In joint operations of this character it will prove extremely difficult effectively to maintain the system of litter, blanket, and splint exchange ordinarily employed by the Army in the field. The break will come in transferring litter cases aboard the small boats.

If the Navy is not in position to establish at the beach head a reserve dump of these articles, which would be the most practical solution of the problem, all ships receiving patients should be ordered to return promptly to the beach head all such equipment received with patients. So far as possible the Navy debarkation officer at the beach should keep a debit list of the articles he is unable to replace.

JOINT ACTIVITIES AT THE BEACH HEAD

Personnel for the Navy organization at each beach should accompany the first wave of the landing force. Remember that as many as four or five widely separated stretches of beach may be occupied simultaneously. To the staff of each beach master (debarkation officer) there should be assigned a naval medical officer under the designation of medical debarkation officer. Decision as to how, when, and where casualties are to be loaded on the boats for evacuation to the ships rests solely with the beach naval authorities. Administratively, the Army's responsibilities cease when it has collected and assembled the casualties on the beach ready for loading. Army medical personnel does, however, assist in the actual loading under the direction of the medical debarkation officer of the Navy. This evacuation from beach to ship is carried on in accordance with a prearranged policy especially adapted to the landing in question. One Army medical officer should be assigned to duty with the medical debarkation officer of the Navy, and one medical officer of the Navy should be assigned to duty with the senior medical officer of the landed Army troops.

This liaison arrangement is for the purpose of maintaining the necessary contacts between the two medical departments ashore. To each of these medical officers should be delegated sufficient authority to decide minor medical problems affecting his own service and to act definitively in promoting effective and efficient cooperation and coordination between the two medical services in their work of temporarily caring for casualties and preparing them for evacuation.

Contact between the debarked medical department and the medical services afloat must be established at the point of landing, and maintained as the various echelons of aid advance with the combatant troops. If the Army staff establishes ashore early a small message center within easy reach of the beach master, better teamwork will be assured. A representative of G-3 and G-4 of the general headquarters staff should be at this message center. All calls from commanding officers for the landing of additional units and supplies in advance of the priority laid down in the debarkation schedule should be routed through this message center.

In transmitting these requests to general headquarters afloat these representatives should note their own views and recommendations thereon. Unit commanders have but a limited knowledge of the general situation obtaining and are prone to stress their own situation and needs to the exclusion of conditions and requirements in an adjoining field of action.

Staff action and coordination are absolutely essential in balancing the many demands for assistance continually coming in. As hospitalization and evacuation, as well as supply, fall under his supervision, the G-4 representative should visa all calls sent out to the anchorage for additional medical department personnel or matériel.

The medical debarkation officer (Navy) should be prepared to operate a property exchange on the beach, especially as regards such essential items as litters, splints, and blankets. If the ships to which patients are evacuated do not fully cooperate by returning to the beach article for article received, a serious shortage ashore will soon occur. The medical debarkation officer should also be held responsible for seeing that every small boat pushing off from shore with a load of wounded has aboard sufficient medical department personnel to care for the patients while en route to the fleet at anchorage. To supplement Navy personnel in meeting this demand certain Army medical department personnel (e. g., ambulance companies not yet needed) should be beached and placed at his disposal.

As a general rule military necessity demands that no wounded be reembarked during the initial stage of the landing operations if such a course will to an appreciable degree retard the beaching of combatants.

This interdiction simply recognizes a fundamental principle of higher tactics—that all available forces be brought to bear simultaneously. Hence, for military reasons, the transfer of the wounded from the beach for reembarkation on the ships must be postponed until the necessary combatant personnel and matériel have been landed.

Bean says that during the afternoon hours of the first day at Gallipoli the lighters and steamboats were used in clearing from the shore to the transports the great accumulation of wounded. "From 12.30 to about 4.30 p. m. not an infantryman arrived on the beach." Speaking of the Gallipoli landing, another writer says: "The intricacy of the preparations required for disembarking some 100,000 men with guns, ammunition, stores of every kinds, with no reserve of small craft and boats, in the face of the enemy, can be imagined."

One of the general principles of evacuation is to maintain the wounded segregated from the fighting forces. Care should be taken to prevent the unsightly wounded from being returned aboard the transports until the combatants have been disembarked. (It appears that one of the transports for the Anzac area was unloading troops down one gangway and bringing mangled and moaning wounded up another gangway at the same time, unquestionably resulting in the impairment of the morale of the landing troops.) The appearance of small groups of walking wounded—slight cases—seldom produces this effect.

Segregating and getting the wounded together at the beach head in such locations as will least interfere with the landing of the troops and their matériel calls for the exercise of good judgment on the part of the medical debarkation officer and his chief—the beach master. The seriously wounded—litter cases—will seldom cause much trouble. While awaiting evacuation every effort should be put forth to shelter them from fire and prevent shock. The walking wounded are apt to cause considerable trouble and confusion unless they are closely controlled. They must be collected in groups and required to remain at the positions pointed out to them until ready for loading. In general it may be clearly specified that no litter cases—seriously wounded—will be evacuated until the landing forces are ashore and the small boats can be spared for this purpose. In getting the troops ashore there is a considerable turn around on the part of the small boats. Accordingly, as regards the walking wounded, the debarkation authorities at the beach head should make every effort to relieve the congestion by evacuating these cases, especially the slightly wounded, on the small boats being returned to the ships for another load of troops. This course should be followed whenever the conditions will permit—provided it does not materially slow up the return of the boats.

Intership transfers, in following out the scheme of secondary evacuation among the vessels at anchorage, will soon get these slightly wounded men where they belong. When word is received at the beach head that regular evacuation of casualties can be started the boats should be loaded in an orderly manner. Slight and serious cases should not be mixed in one boat.

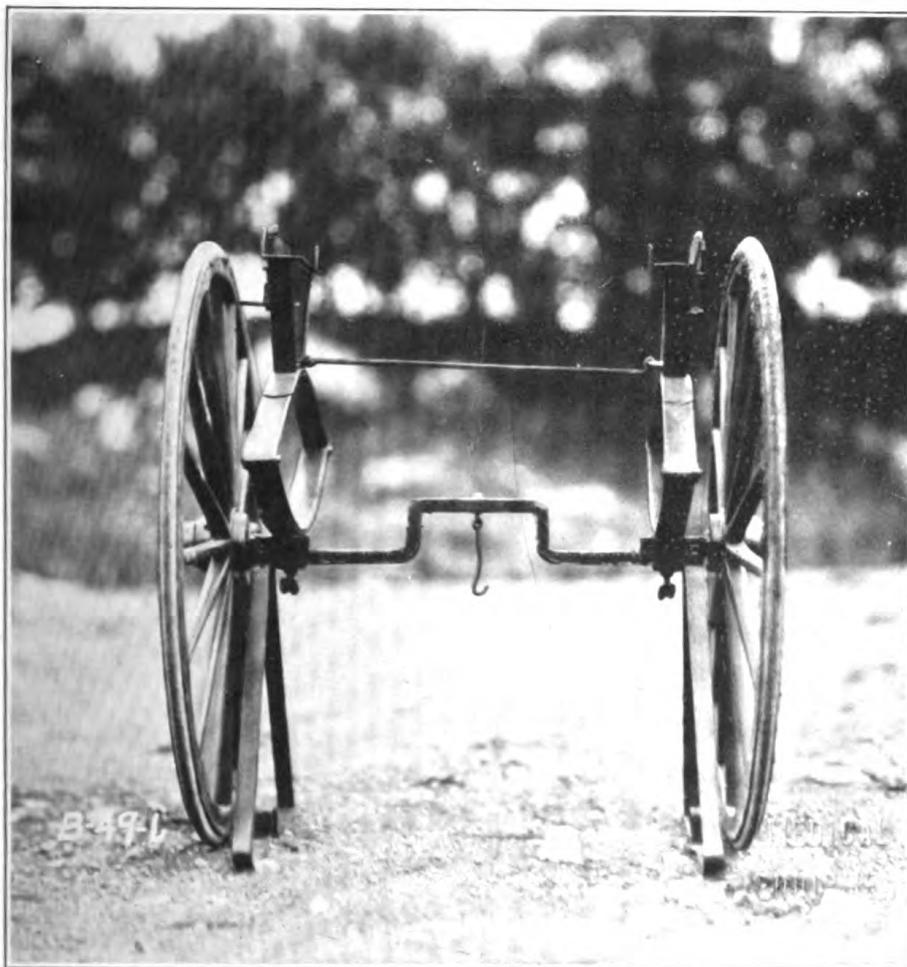


FIG. 1.—MODEL OF TWO-WHEELED LITTER CARRIER DEVISED BY MAJ. J. P. FLETCHER, MEDICAL CORPS, U. S. ARMY

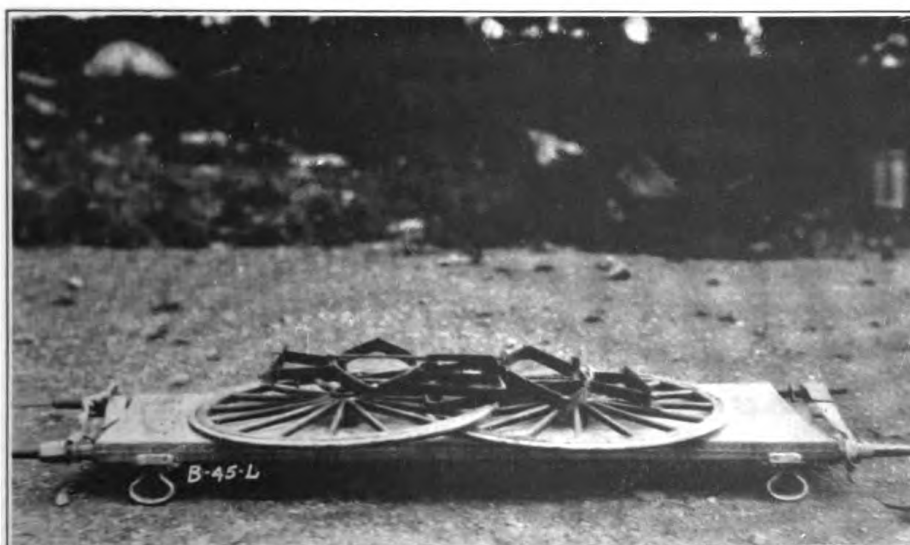


FIG. 2.—SAME LITTER COLLAPSED. A DEVICE OF THIS SORT SHOULD BE USEFUL FOR NAVAL LANDING FORCES

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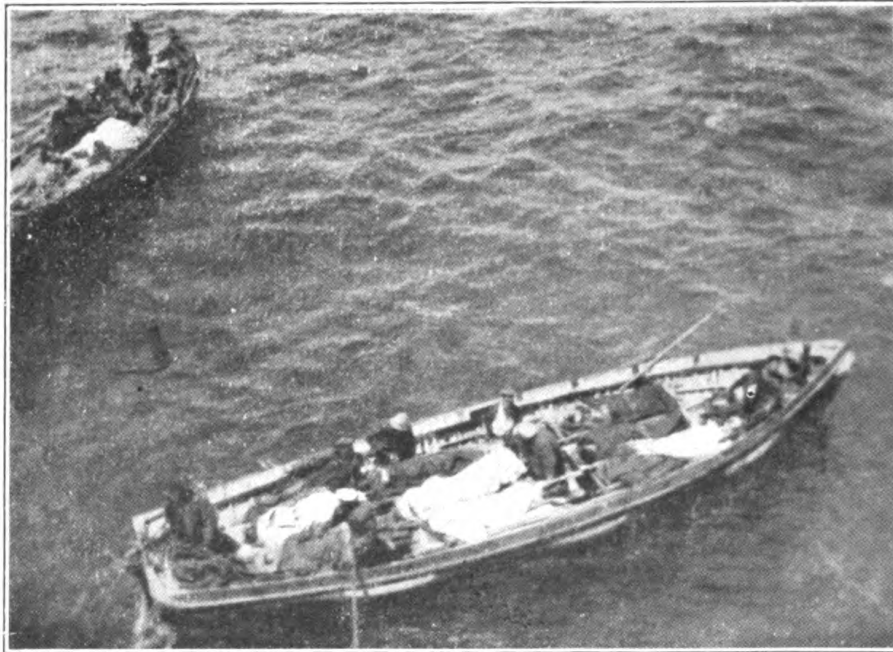


FIG. 3.—WOUNDED BEING BROUGHT FROM ANZAC COVE TO A HOSPITAL SHIP.
ILLUSTRATES METHOD OF STOWING WOUNDED IN SMALL BOATS

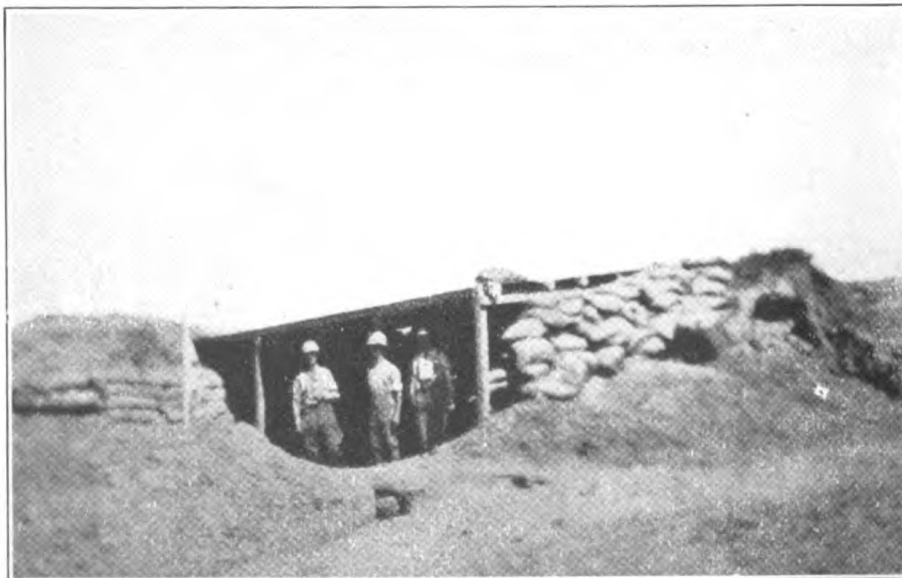


FIG. 4.—ADVANCED DRESSING STATION ON HELLES FRONT

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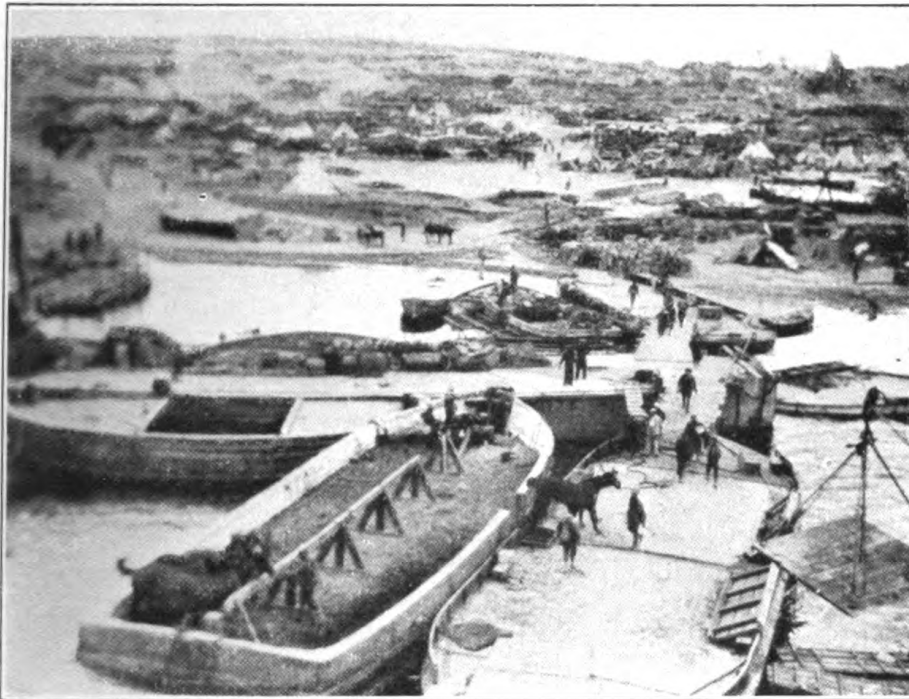


FIG. 5.—VIEW OF "V" BEACH, HELLES FRONT. GIVES AN IDEA OF CONDITIONS TO BE EXPECTED AT LANDING POINTS OF JOINT ARMY AND NAVY FORCES



FIG. 6.—FIELD AMBULANCE TRENCH ON HELLES FRONT. ON SKYLINE AT LEFT ARE TENTS OF NO. 17 STATIONARY HOSPITAL

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FIG. 7.—THE CASUALTY CLEARING STATION AT ANZAC, LOOKING
TOWARD SUVLA

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Casualties requiring immediate operation, and so classified at the beach head, should be placed in separate boats and the man in charge of the boat informed as to their immediate operation status, in order that the evacuation officer afloat may make suitable disposition of such convoys. The seriously wounded, which usually are litter cases, should also be embarked in separate boats and the man in charge of each of those boats so informed as to their status.

This triage or sorting at the beach head and the adoption of a loading schedule in keeping with such sorting made there are of extreme importance in receiving and properly arranging for the care of these cases when the small boats reach the vessels at anchorage.

All these boats when exclusively engaged in the transportation of casualties should fly the Red Cross flag at the bow, not so much from the standpoint of affording protection from the enemy as to provide a ready means of identifying the mission of these boats as they approach the fleet at anchorage.

In the later stages of landing, swift hospital boats are deemed essential for the proper evacuation of the sick and wounded.

The motor lighters supplied the British forces in the latter part of the Gallipoli campaign were flat bottomed and fitted with a special gangway which, on their taking to shore, was let down from the bows to the beach. They were capable of carrying 400 men or 40 horses at a time and proved most suitable for all sorts of work. (Wemyss.)

The Turks are said to have fought as gentlemen and to have never fired on any boats carrying wounded, though there is nothing to stop them doing so except good feeling, because many of the boats could not come under the Geneva convention, having many other duties of a military nature to perform. (Wemyss.)

PRINCIPLES GOVERNING THE EVACUATION OF MILITARY PATIENTS IN TIME OF WAR ON SHIPS UNDER THE CONTROL OF THE NAVY

Under this heading the authors have attempted to lay down certain principles which might well be made the basis of official regulations to be prepared at some future date by a joint Army and Navy board. They reflect World War experience in the evacuation of thousands of sick and wounded from our base ports in France to the homeland in the United States. Nearly all of the data contained herein were abstracted from a report on this subject submitted by Maj. Gen. R. E. Noble, M. C., United States Army, as a result of his experience as base surgeon of the port of Bordeaux, France, during the World War.

As soon as base ports have become organized and our military hospitalization in the theater of operations established, a steady

flow of evacuations from the Expeditionary Force must be inaugurated in order that all those who have ceased to be military assets may be gotten out of the theater. This necessitates the establishment of a well-systematized method of handling large numbers of sick and wounded to be embarked on vessels, preferably hospital ships, for transportation to the United States. The Army and the Navy should have in advance an acceptable code to be followed in this eventuality. For reference to our views on the status and operation of hospital ships, which are intimately connected with this subject, see Part II.

The term "port of embarkation" used herein means the port in the theater of operations where patients are loaded on the ship. The term "port of debarkation" used herein means the port in the United States where patients are unloaded from the ship.

The term "port surgeon" used herein means the medical officer of the Army in immediate charge of medical activities at the port.

1. *Checking companies aboard ship.*—The personnel adjutant at the port of embarkation will, at a convenient place near the ship's gangway, establish a station, past which casual companies of sick and wounded will be marched for checking against the passenger lists. In order that the checking may be expedited a representative of the Navy will, at the same time, check a duplicate passenger list. Any errors or discrepancies found in checking will at once be rectified. When the checking of a company is completed the passenger lists will be compared and corrections and proper notations made on all lists. Four copies of the passenger lists will be signed by the personnel adjutant and the representative of the Navy, one copy will be delivered to the ship's surgeon, one copy retained by the personnel adjutant, and two copies will be delivered to the evacuation officer, to be filed with his report to the port surgeon.

2. *Deposit of papers and records with ship's surgeon.*—All papers and records pertaining to sick and wounded embarked on a vessel under the control of the Navy will, for safe-keeping, be deposited with the ship's surgeon, who will, prior to debarkation, return to company commanders all papers, with such additional records as may have been made while in sick bay, pertaining to the members of his company.

3. *Inspection after embarkation of sick and wounded.*—After embarkation of sick and wounded the evacuation officer, in company with an inspector general and designated ship's officers, will inspect the berth space allotted to the sick and wounded to see that it is not overcrowded and that it is well ventilated. They will, after this inspection, confer with the commanding officer of the ship regarding their findings and will submit a written report in duplicate

to the port surgeon, to be filed as a part of the report of the evacuation officer on the embarkation of sick and wounded.

4. *Notification of departure of vessel transporting sick and wounded.*—The Navy authorities in the occupied area will cable to the Navy Department, for the information of the War Department, the date of sailing, name of vessel, and destination, the number of sick and wounded on board, and the distribution in classes.

5. *Relation of ship's surgeon to sick and wounded.*—The responsibility for the proper treatment and care of the sick and wounded en route to the United States having been assumed by the Navy, the ship's surgeon will, on proper forms to be supplied by the Army, make such reports in change of status of the sick and wounded, as is required of the commanding officer of a military hospital by Army Regulations or existing orders. These reports to be complete and accurate, and to be included with other papers and reports to be delivered to the surgeon of the port of debarkation, through the commanders of patient companies.

6. *Sick bay—Control of.*—The ship's sick bay is under the control of the senior medical officer of the Navy attached to the ship, who is responsible for the Army sick and wounded. The senior medical officer of the ship will hold sick call for sick and wounded if Army medical officers do not accompany the contingent. Sick call for the sick and wounded will be held by Army medical officers when attached thereto or assigned to duty aboard vessels of the Navy. Patients requiring rest in bed or hospital treatment will be transferred to the ship's sick bay and to the care of the senior naval medical officer of the ship.

7. *Army medical personnel on board a vessel under control of the Navy.*—When officers, nurses, or enlisted men of the Medical Department are assigned to duty with the sick and wounded en route to the United States they will report to the commanding officer of the vessel for assignment to duty and, while on duty, are subject to Navy Regulations, and will, without regard to rank, be subordinate to the ship's surgeon, who will assign each to such duty as may be necessary. Medical officers of the Army are available for sick call for troops, or duty with sick and wounded, and for assignment to duty in the dispensary or sick bay. They will make sanitary inspections of the berth space of the sick and wounded and perform such other duties as may be required by proper authority. Medical Department personnel detached for duty with the sick and wounded on board a vessel under control of the Navy will be relieved from such duty as soon after arrival at the debarkation port in the United States as their services can be spared.

8. *Casual medical officers on ship transporting sick and wounded.*—Any casual medical officer on board a vessel under the control of the

Navy transporting sick and wounded is considered as on duty with troops and will report to the commanding officer of the ship for assignment to duty, and is, while on such duty, subject to Navy regulations and under the immediate command of the ship's surgeon, regardless of relative rank.

Casual medical officers will be relieved from such duty when the sick and wounded are debarked, or sooner if their services can be spared.

9. *Commanding officer of troops.*—The senior officer of the Army on board who is physically fit is the commanding officer of troops and the representative of the Army in dealing with Navy officials aboard.

10. *Discipline.*—Sick and wounded of the Army while being transported on a naval vessel shall be subject to and obey Navy Regulations, but shall not, unless their physical condition permit, be liable to police duty. Should their physical condition permit and if the commanding officer of the ship shall deem it advisable to do so, he may divide the police duty between the enlisted men of the Navy and the physically fit sick and wounded of the Army on board.

11. *Inspection for vermin and for venereal disease.*—Under the direction of the ship's surgeon, all sick and wounded will, prior to arrival at the ports of debarkation, be inspected for vermin and for venereal disease. Those found infested with vermin will, with their clothing and equipment, immediately be disinfested. Sick and wounded with venereal disease will be segregated, proper notation being made on records and passenger lists, and will be debarked as venereal patients.

12. *Debarkation.*—Debarkation of sick and wounded will not be made prior to the hour mutually agreed upon by the commanding officer of the ship and the authorized representative of the commanding general of the port of debarkation.

Debarkation will be by companies and in the order desired by the surgeon, port of debarkation.

A company of sick and wounded will be debarked in the order in which their names appear on the passenger list.

13. *Disposition of sick and wounded on arrival at ports of debarkation in the United States.*—Disposition of the sick and wounded on arrival at the port of debarkation will be in accordance with the orders of the commanding general of the port.

HOSPITAL SHIPS IN TIME OF WAR

As an appendix to this article the Army collaborator desires to set forth here for consideration the views of the Surgeon General of the Army on the subject of providing hospital ships for the military forces in time of war. These views are presented as timely and

pertinent to the study under discussion because it is believed that the Navy is not in full accord with the Army on some points mentioned below. Formal action by a joint board to be convened for the purpose at some future date seems necessary. In brief, the principles to which the Army subscribes are:

(1) In any war of the future the Medical Department of the Army believes that for the overseas evacuation of patients from a theater of operations reliance should be placed solely upon quickly convertible and available commercial tonnage.

(2) For purposes of classification, vessels so taken over and converted into use as hospital ships should be designated as Class B.

(3) Class B hospital ships should be the only type utilized for Army evacuations.

(4) Our conception of a Class A hospital ship is the specially constructed vessel on duty with the Navy and serving as the floating hospital of the fleet.

(5) In our opinion the converted or Class B hospital ship should be a Medical Department organization exclusively and recognized as entitled to all the protection accorded by both the Geneva and Hague conventions.

(6) Troop transports utilized for the transportation of patients will not be entitled to protection, and all the persons thereon will be held subject to the usual belligerent risk.

(7) As to the lines of control to be exercised over the overseas transportation of sick and wounded, the Medical Department of the Army believes:

(a) That if the transport service is in charge of the Navy (e. g., under conditions such as existed in the World War), Class B hospital ships should also be in charge of the Navy, and the responsibility for the proper care, treatment, and protection of patients being transported thereon devolve upon the Navy between the ports of embarkation and debarkation.

(b) That if the transport service remains in charge of the Quartermaster Corps of the Army, Class B hospital ships should be provided by and operated under the control of the Army.

(8) That hospital ships of either class should be commanded by a medical officer.

(9) That class B hospital ships or other ships which in emergencies are transporting exclusively sick and wounded should enjoy the same immunity of war as are accorded class A hospital ships by the international conventions.

(10) That suitable amendments to international conventions should be sought, to the end that some ready means of identifying vessels transporting sick and wounded can be devised over that now prescribed for typical class A hospital ships. In short, how shall a vessel utilized to-day for the transport of combatant troops be marked

to-morrow when, on a turn-around, it is transporting back to the base exclusively sick and wounded? It should be so marked as to preclude enemy aircraft and submarines from sinking it in the belief that it is still a combatant ship. In this connection it must be remembered that our experience in the World War in transporting sick and wounded from France to the United States was unique, in that our sea lane was kept practically clear of the enemy. Imagine the storm of public opinion which would have been aroused had one of these large ships carrying patients been sunk in the mid-Atlantic. No civilized nation desires to wage war against the disabled, to sink ruthlessly a ship carrying men whose combat value is nil. After all, public opinion, national as well as international, is a weighty item in the conduct of any war. It is only fair and just that a way be devised to give all belligerents some ready means of quickly identifying a ship that is transporting noncombatants—the sick and wounded. No effective method of solving this problem has as yet been laid down in our international conventions. The class A hospital ship which remains the floating hospital throughout hostilities is properly marked and immune. Our attention must now be directed toward obtaining the same immunity for class B and other ships utilized in the transportation of patients. The problem is an easy one to solve, but it requires international consideration and action at The Hague. The medical department of the Army is firm in the belief that this question of neutralizing ships for patients must be taken up and settled before the advent of another war. Furthermore, it is believed that all available space on these immunized ships in proceeding to the theater of operations should be utilized in transporting the personnel and matériel of hospital units for the medical departments of the military and naval forces, in order that such forces may enjoy the assurance, guaranteed by such immunity, that these vitally essential units shall reach their destination for service as intended, and not be submitted to the risk of being sunk, as would be the case if transported on a combatant ship. This is not proposed for the benefit of the medical department personnel themselves. It is a measure specifically designed to give additional assurance that the combatant forces will have at hand the necessary medical department installations properly to care for the sick and wounded that accrue. Medical department allowances are never prodigal, and one can well picture the situation confronting any force that has lost by avoidable sinking any appreciable number of hospital units.

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IDENTIFICATION BY THE TEETH

A NEW SYSTEM OF CLASSIFICATION

By J. H. TAYLOR, Identification Section, Bureau of Navigation, Navy Department

This system has been devised for use where fingerprints can not be depended upon for purposes of identification. It will be found very valuable in circumstances similar to those which followed the explosion at Lake Denmark and the raising of the U. S. S. *S-51*. By this system the teeth can be classified accurately and much work eliminated. If the teeth are not classified, every record must be examined. With this system in operation, the dental charts of men known to have been killed in an explosion, or in other ways, can be withdrawn from the files and classified in a few minutes. As a dental chart is made for everyone who enlists in the Navy, and for officers annually, the classification will be found very useful, and it will be impossible for anyone in the Navy to be buried as "unknown" unless both the fingers and teeth are destroyed.

As the originator of this system of classification, it is the writer's desire that it be given to the naval service and that all dental officers be required to familiarize themselves with it, so that, when the necessity arises, the identification of an individual may be made immediately.

The system is so broad in its scope that it is believed no difficulty will be experienced in the classification of the teeth of any person examined.

It is important that, in every case, the charts should be made by a dentist and not by a novice.

PRIMARY CLASSIFICATION

The primary classification numbers are obtained from the fillings and caries found in the teeth. If a filling is found in No. 1 it is given a numerical value of 32,768, and so on, according to the values given in the table for primary classification numbers (Table 1). The values given to fillings and caries in the upper set of teeth are added together and used as the numerator. The values given to fillings and caries in the lower set are added together and used as the denominator. When perfect teeth are found in either the upper or lower set they have no numerical value.

For example: In an upper set, only Nos. 6 and 14 show caries and fillings. The value given to a filling found in tooth No. 6 is 1,024 and that of a filling in No. 14 is 4. By adding these together, we obtain the numerator, 1,028. The other teeth in the upper set are perfect and, therefore, have no numerical value. All fillings, caries, crowns, or bridge work are given numerical values according to the teeth in or on which they are found, while missing teeth, roots, and artificial dentures are not used in the primary classification.

Numerical value	Lower teeth	Upper teeth	Numerical value
32,768	17	1	32,768
16,384	18	2	16,384
8,192	19	3	8,192
4,096	20	4	4,096
2,048	21	5	2,048
1,024	22	6	1,024
512	23	7	512
256	24	8	256
128	25	9	128
64	26	10	64
32	27	11	32
16	28	12	16
8	29	13	8
4	30	14	4
2	31	15	2
1	32	16	1

TABLE 1.—*Values given to fillings and caries according to teeth in which they appear*

It is important that the kind of filling found in each tooth be noted on the chart. Numerical values are given for teeth in which any of the kinds of fillings or dental work mentioned below are found:

- a—Amalgam.
- b—Caries.
- c—Red copper cement.
- d—Black copper cement.
- e—Silicate cement (porcelain).

- f—Gutta-percha.
- g—Gold.
- j—Gold crown.
- k—Porcelain crown on root—plain or Richmond.
- l—Bridge work—fixed.

SECONDARY CLASSIFICATION

The secondary classification number is obtained from the missing teeth, artificial dentures, and roots found in a set. These have no numerical values, but are designated by letters, as follows:

m—Missing.

r—Root.

p—Artificial dentures (partial).

q—Bridge work—removable.

Perfect teeth have the classification..... 0

Artificial dentures (full)—upper..... 00

Artificial dentures (full)—lower..... 000

In obtaining the secondary classification number the teeth are always read from right to left. For example, if Nos. 1 and 3 teeth are missing and roots are found in Nos. 5, 6, and 11. the secondary classification number would be written as:

(2) mr (3)

The secondary classification number for the lower set is obtained in a like manner.

SUBSECONDARY CLASSIFICATION

In the subsecondary classification numerical values are also given. These are given only to missing teeth, roots, and dentures. The number of the tooth is the numerical value to be given in each case—that is, if No. 1 tooth is missing it has a numerical value of one—and so on. For example:

Upper set—

No. 1—missing.

No. 16—roots.

Subsecondary classification number for the upper set is 17.

Lower set—

No. 17—missing.

No. 23—dentures.

No. 31—roots.

For the lower set the subsecondary classification number is 71.

The final subsecondary classification number would then be 177.

DOUBTFUL CASES

At times it will be necessary to work various combinations in order to locate a set. An old chart may show a perfect tooth, when, as a matter of fact, the tooth may have been filled and not noted on the old chart. To solve cases of this kind it will be necessary to proceed as follows:

If No. 1 tooth is shown on the old chart as perfect and it now has a filling, deduct the numerical value given to this tooth, and the primary classification number will be the same as shown on the old chart. If this procedure is followed in all doubtful cases, the correct chart may be easily found.

A sufficient number of combinations have been provided to take care of all cases and, if these instructions are carefully followed, no difficulty should be encountered.

The example which follows is worked out in accordance with this plan. If this is carefully studied, a correct idea of the working of the system will be obtained.

Example:

Record of first dental examination—

- 1, 15—missing.
- 2, 5, 16, 18, 29, 30—amalgam fillings.
- 3, 9, 10, 14, 19, 20—caries.
- 6—caries subsequent to first examination.
- 7—cement filling.
- 8—gold filling.
- 11—Richmond crown.
- 13—roots only remaining.

Record of subsequent operations—

- 3—amalgam filling.
- 9—cement, synthetic, filling.
- 31—extracted.

To find the primary classification number, add the numerical values for these teeth, thus:

<i>Upper set</i>		<i>Lower set</i>	
2 equals.....	16,384	18 equals.....	16,384
5 equals.....	2,048	29 equals.....	8
16 equals.....	1	30 equals.....	4
3 equals.....	8,192	19 equals.....	8,192
9 equals.....	128	20 equals.....	4,096
10 equals.....	64		
14 equals.....	4		
6 equals.....	1,024		
7 equals.....	512		
8 equals.....	256		
11 equals.....	32		
13 equals.....	8		
	<hr/>		<hr/>
	28,653		28,684

The numerator is the sum of the values for the upper set, and the denominator the sum of the values for the lower set. Hence the primary classification number is

$$\frac{28,653}{28,684}$$

There are two teeth missing in the upper set and one in the lower, so the secondary classification is

$$\frac{2m}{1m}$$

The subsecondary classification is obtained from the numbers of the missing teeth, which, in this example, are Nos. 1 and 15 in the upper set and No. 31 in the lower set. Therefore the subsecondary classification number is

$$\frac{16}{31}$$

The final classification, made up of all of these, is therefore

$$\frac{28,653}{28,684} \quad \frac{2m}{1m} \quad \frac{16}{31}$$

No additional work will be necessary in connection with this system, as it is not proposed to classify the dental records except when necessary in cases of marine disaster. If 100 men are known to have been killed, it is proposed to classify the dental charts of these men only. This will reduce the amount of work required in making comparisons to the minimum and will eliminate the necessity of making a comparison of all these records when a dental chart of a dead man is made.

At present no provision has been made for the classification of the teeth.

In filling out the physical examination sheet the examining surgeon should state on the chart that the 32 teeth are present and free from decay or fillings, if this is the case. If this is not stated, it may mean a perfect set of teeth or only that there has been neglect or oversight on the part of the examiner.

The dentist in making his original examination should note if Nos. 1, 16, 17, and 32 are unerupted or have been extracted.

On the margin of the chart the dentist should note any irregularity of the teeth, such as cracked or chipped enamel, abnormal rotation, inclination, or spaces. This would be of particular value when all teeth, with or without the third molars, are present and have few, if any, caries or fillings.

Dental officers should be instructed to forward to the Bureau of Medicine and Surgery any dental abstracts found not to correspond with the patient's mouth in order that they may be referred for comment to the dentist who made them. This would result in fewer errors being made in the dental charts, which, in order to be of value, must be made out with care.

Identifications are made by comparison of charts. For example, if in the charts being compared it is found that they check on the following points, identification is positive:

Original chart	Chart made to establish identity
No. 1—missing.	No. 1—missing.
No. 3—roots.	No. 3—roots.
No. 5—caries.	No. 5—caries.
No. 9—cement filling.	No. 9—cement filling.
No. 12—gold crown.	No. 12—gold crown.
No. 16—cracked enamel.	No. 16—cracked enamel.
No. 17—missing.	No. 17—missing.
No. 20—gold filling.	No. 20—gold filling.
No. 24—missing.	No. 24—missing.
No. 27—gold filling.	No. 27—gold filling.
No. 30—roots.	No. 30—roots.
No. 32—missing.	No. 32—missing.

A survey of every man's teeth should be made at least once a year. When the survey is made, the report should be in duplicate, one copy to be kept by the ship or station on which the man is serving, the other to be forwarded to the Bureau of Medicine and Surgery for its files. This plan will insure accurate dental charts.

This system of classification is designed to place the charts in their proper groups. The final identification is made by comparison of a chart of the teeth of the unknown dead person with the existing record on file.

NOTE.—Figures obtained by the Metropolitan Life Insurance Co. show that the ratio of teeth without caries or fillings may be found to be one to two thousand.

AN ANALYSIS OF THE ANNUAL PHYSICAL EXAMINATION OF A GROUP OF OFFICERS

By L. H. RODDIS, Lieutenant Commander, Medical Corps, United States Navy, and G. W. COOPER, Lieutenant (junior grade), Medical Corps, United States Navy

The results of the annual physical examination of 87 officers form the subject of this paper. Some matters of considerable interest were noted, and it is felt that other medical officers will welcome an opportunity to compare their findings with our own.

The examinations were made on board ship in Guantanamo Bay, Cuba. Not only were the examinations held while in a tropical climate, but practically every officer had a record of long tropical service. The greater number of these had been with the Scouting Fleet the previous autumn and had spent the extremely hot months of September, October, and November in Cuban waters. The locality and the previous service of the officers are matters of importance, as it appears that the uniformly low blood pressure found in the normals is a definite effect of climate.

The following table gives a résumé of pathologic conditions seen:

Defects in order of number

Obesity	25
Functional tremor of the hands	25
Cardiac conditions	7
Chronic interstitial nephritis	3
Defective vision	3
Defective hearing	2
Chronic parenchymatous nephritis	1
Syphilis	1
Underweight	1
Without defects except for obesity or functional tremor of the hands	74
Without defects except for obesity or functional tremor of the hands but showing blood pressure below normal	73

This little table presents some interesting facts. The first is the large number of officers who show varying degrees of obesity. The second is the large number with cardiac conditions and functional tremors. Probably the most significant finding of all is the relatively low blood pressure of those without defects, except overweight or functional tremors. The systolic pressure was found to be from 10 to 15 millimeters of mercury below the figure usually given as standard and is apparently a definite modification of blood pressure produced by tropical climate. If this view is correct, climatic conditions must be added to the list of factors known to produce changes in the normal blood pressure.

In studying and recording the cases of obesity it became necessary to set up an arbitrary scale to distinguish the different degrees. The following classification was adopted:

Slightly obese.—The waist measure not so great as the minimum chest measure but within 2 inches or less of it.

Moderately obese.—The waist measure equal to or not more than 1 inch greater than the minimum chest measure.

Obese.—The waist measure more than 1 inch greater than the minimum chest measure.

Of the 25 officers inclining to stoutness, 16 were slightly obese, 7 were moderately obese, and 2 definitely obese by this standard.

There is a tendency to think the worst sort of things in regard to the causes of obesity and to assume at once that the fat man is an indolent and overindulgent person. It must be recalled, however, that heredity probably plays the most important rôle in making an individual obese. Lack of exercise and overindulgence in food and alcohol are contributory causes, but it is a mistake to assume that every obese individual is lazy and an habitually heavy eater. Many fat people eat very sparingly and also take much more exercise than those of slender build, but their metabolic anomalies keep them from losing flesh. Still there is little doubt that indolent habits, over-eating, and the use of alcohol, particularly wines and malt liquors, tend to enhance the hereditary tendency, and the majority of the cases seen by us in the series could make a marked reduction in their waist line by attention to habits and diet.

This high incidence of obesity among a group of naval officers is a matter of some moment. In addition to the bad personal appearance, an effect accentuated by the cut of the naval uniform, there is strong evidence that the obese are predisposed to diabetes, arthritis, and degenerative cardio-vascular diseases. It is significant that we had seven cases of the latter in this group of 87 officers; two of these cases so severe that retirement will probably be necessary. Furthermore, the surgery of the obese presents many difficulties and dangers not encountered in operating upon those of normal figure, and the statistics of our great life insurance companies indicate that longevity is greatly reduced where obesity exists. There is also a loss to the Navy, due not only to the pathological conditions to which excess of fat predisposes, but to the impairment of efficiency by the difficulties these heavy people experience in naval life, where much time is spent in exceedingly hot climates, and where getting in and out of boats, climbing steep gangways and ladders, or working in hot engine rooms or turrets is a part of their daily task.

The tremors noted were all moderately fine, regular, and persistent. They were passive but often increased a little with intentional movements. Other neurological findings were negative in these cases except for somewhat active reflexes, and there is little doubt that these tremors were due to coffee, tobacco, alcohol, or combinations of these substances.

The two cases of defective hearing, the three cases of poor eyesight, and the single case of lues are not particularly significant. The great difficulties in attempting to determine degrees of deafness when on board a cruising ship were again brought home, the hum of men and machinery giving an opportunity for naught but a guess at the amount of disability. One case of defective vision was of interest, as it was found in a Christian Scientist who had thrown away his glasses. The officer with syphilis had received thorough

treatment. The chronic parenchymatous nephritis was found in this officer and was possibly luetic in origin. The three officers having interstitial nephritis were also suffering from cardiac conditions, the nephritis being a part of the general cardiovascular-renal changes.

The frequent occurrence of low-blood pressure in these examinations made in the Tropics impressed us as of some significance and led us to the comparative study of anticipated normals and the actual pressures found by the Rogers (Tycos) sphygmomanometer. This comparison was drawn and the contrast between anticipated normals and the actual pressures for the various groups of officers demonstrated by the tables and curves. The officers were grouped on the basis of age. Grouping by physical abnormality, such as obesity, myocarditis, etc., was at first attempted but had to be ruled out. Even had the cases in the various pathologic groups been proved to be of one definite pathology only, the known effect of that particular condition upon the expected blood pressure normals for each case at its own age must necessarily have first been discounted before any effect upon blood pressure by climatic conditions could have been deduced.

This presented an involved and impossible problem in which neither constant nor absolute appeared in the very first premise, namely, the known effect of the pathologic entities recounted in this analysis upon expected blood-pressure normals.

Consideration, therefore, of any influence exerted by tropical climate upon blood pressure within the various pathologic groups was ruled out as fallacious, and such influence was inspected by its effect upon normal or apparently normal subjects and within the various age groups thereof. By this means the expected normal systolic and diastolic pressures for any one age served as a fairly accurate criterion with which to compare the average of pressures for all subjects included in that one particular age group. It is true, however, that these expected normals for one age group are by no means invariable, but are arbitrary only, and are rather to be considered as variable quantities, but with fixed, though as yet but tentatively agreed upon, limits. Thus the new difficulty of comparing a constant with a variable quantity arises and leaves the only practical alternative which we have pursued, that is, treating the expected blood pressures for normal subjects in the Temperate Zone, at the various ages, as constant rather than variable, and comparing with them the blood pressures taken in the Tropics. A curve showing this comparison gives low values for blood pressures of those included in our examination. These subjects were without exception natives of the Temperate Zone and temporarily resident in the Tropics. Opinion advanced by other medical men experienced in the Tropics also indicates a like conclusion. Natives of the Tropics

appear also to share the lower blood-pressure values found in their Temperate Zone visitors. It would be interesting to know if the Tropical Zone native experienced any change of blood pressure upon residing in the Temperate Zone.

The averages of the blood pressures of all normal subjects examined by this examining board in the Tropics, with the averages of ages, are given for the years 1925 and 1926.

The 1925 curve of age-group pressures is also found to follow that of 1926.

	Average age	Average systolic	Average diastolic
1925.....	39.6	114	73
1926.....	38.7	118	75

The number of officers in the various age groups ranged from one at the age of 25 to eight at the age of 32 years. No subjects were examined in the following age groups: 37, 45, 50, 52, 53, 54, 55, and 57 years.

The curves shown are as follows:

- (a) The expected normal systolic pressures for the age groups.
- (b) The expected normal diastolic pressures for the age groups.
- (c) The averages of systolic pressures found in the various age groups.
- (d) The averages of diastolic pressure found in the various age groups.

Influence of climate upon blood pressure is by no means surprising. Very little is definitely known as to the constancy of such effect, however. On the other hand, the bearing of climate upon the general physiologic whole of man is recognized and definite conclusions accepted. Our findings indicate a lower average systolic pressure for normal subjects in the Tropics than in the Temperate Zone. Diastolic pressure showed a like change. It is of interest to mention that our usual standard of blood pressure, given in the texts, was obtained by observations made in the Temperate Zone. Woodruff, in dealing with the problem of adjusting Temperate Zone military forces to tropical duty, has perhaps overstressed the malevolent effects of tropical climate upon the physiology of the white man. Since his work in 1905 there has been a reaction in favor of the Tropics. This was most natural following the memorable house cleaning in the malarial and yellow-fever areas. We feel that tropical climate does effect a decided change in the physiologic whole of the white man. It is not surprising, therefore, from this older viewpoint, to observe changes in individual physiologic processes such as the tropical hypotension here considered.

Our own series of 173 cases showed an average systolic pressure 11.5 points below the anticipated normal for the Temperate Zone, while the diastolic pressure averaged a drop of 11.2 points in the Tropics. In our own cases, therefore, pulse pressure was practically unaffected—simply adjusted lower in the scale of blood pressure.

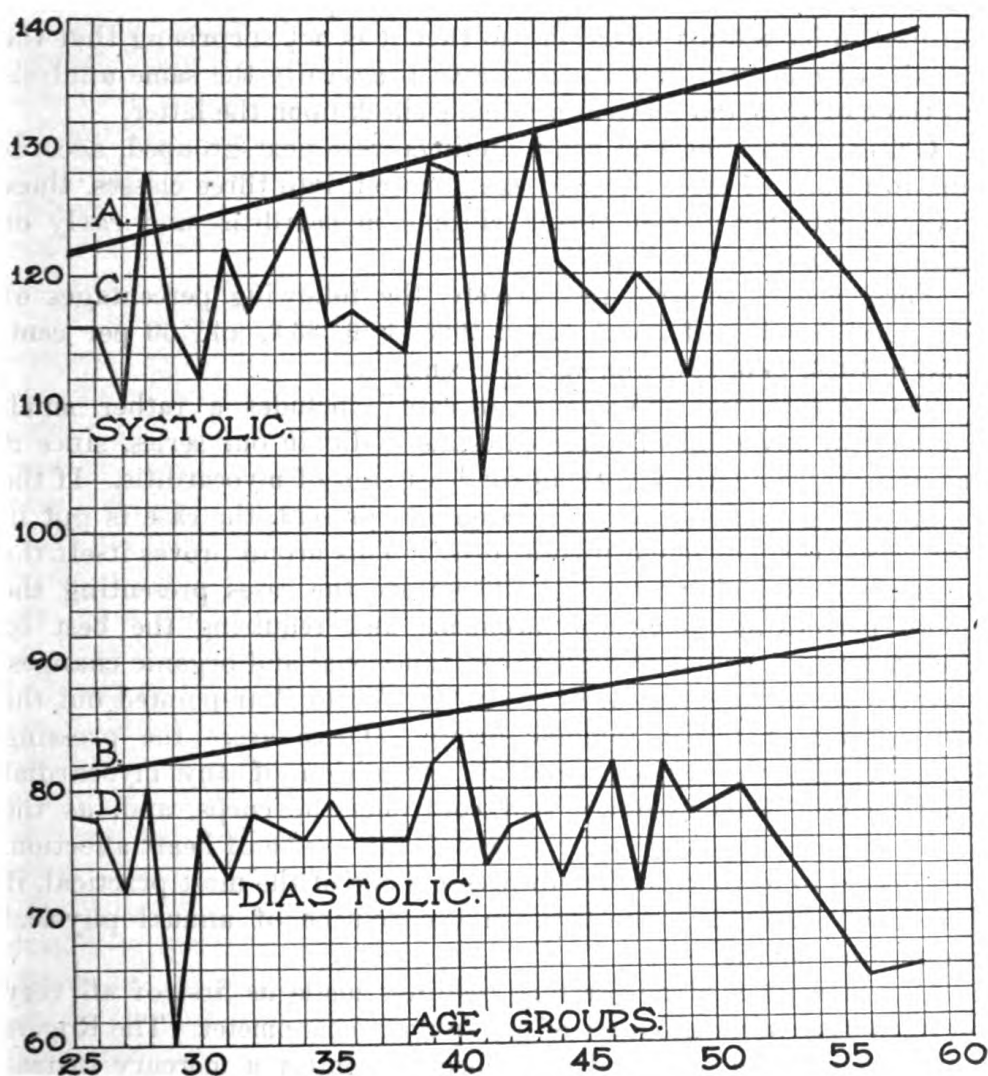


Chart 1

The total number of examinations made by this board was 86 for 1925 and 87 for 1926. Most of those examined both years presented a pulse rate above the orthodox 72, and in 1925 the majority were higher than the upper limit for the variable normal: i. e., 60 to 82. The 1925 average was 87 and the 1926 average 81. Rates were taken with patients sitting and at rest. No conclusion as to any influence of the Tropics upon average pulse rate is ventured.

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In the 1925 examinations 6.9 per cent of those examined showed signs of cardiac change by the heart-function test or study of cardiac reserve. In 1926 this percentage was 8.04 per cent. The personnel roster of those examined in 1926 showed only 17 changes from that of 1925. All individuals listed in the 1926 examination and not in the 1925 were found to be normal except five; three of these proved to have heart affections, so that it is not surprising that the results of our 1926 examinations give practically the same analysis as those of 1925 and serve as a reliable check upon the latter.

Officers with abnormal heart findings were next grouped, according to results of more detailed examination, into three classes, those having valvular disease, frank chronic myocarditis, and early or latent chronic myocarditis.

These classes showed, respectively, the following percentages of the total number of heart cases: 1925, 16.6, 33.3, and 50 per cent, and in 1926, 14.3, 42.8, and 42.8 per cent.

The classification "Valvular disease" includes a rather small number in any total of heart cases, as it did in our series, since it assumes valve affection without the least sign of myocarditis. If the slightest signs of myocardial change are present, the case is put in the class "early or latent myocarditis." This group proves itself the most difficult and interesting. These are the cases presenting the more perplexing diagnostic problems and requiring the best of judgment in differentiating between functional and organic changes. Experience of the Medical Corps in the World War pointed out the importance of this pathologic group. There arose the pressing necessity for the earliest possible recognition of any myocardial inefficiency. This necessity still confronts the corps, and, as the future promises even greater concern for this type of heart affection, it appears to us that this group presents one of the most practical, if not most engaging, objectives in the routine of annual physical examining boards.

Our many low blood-pressure readings made us first of all very suspicious as to the accuracy of our sphygmomanometer. The Rogers (Tycos) instrument was double checked against a mercury instrument and also one of its own kind. The next check was in the personal element, members of the board comparing their readings upon the same subjects with those of other members. There was no demonstrable source of error.

Our blood-pressure observations were made before we had any knowledge of similar work by other men. It was only upon reviewing the literature that we found our conclusions to be in accord with the recent work of Siler (1925).

SUMMARY

1. There was among this group of officers an unusually high incidence of obesity, functional tremors, and degenerative diseases of the cardiovascular system.

2. The systolic and diastolic blood pressures of the normals of the group were uniformly low, being from 10 to 15 millimeters of mercury below the standard for temperate climates. As the examinations were made in the Tropics, and nearly all the officers examined had had long tropical service, it is believed that to the factors known to modify the normal blood pressure, climate should be added. The profound effect of climatic conditions upon the animal economy has long been known and recognized. In this lowered blood pressure we have a definite physical finding that appears to be an indicator of the lowered vasomotor tone and the general debilitating effect produced by tropical climates. This is also in accordance with the findings of Colonel Brookes, who further found that the fall in systolic pressure was associated with only a slight fall of diastolic pressure, a still stronger evidence of the lessened reserve of the cardiovascular system.

3. This blood-pressure response probably occurs very soon after arrival in the Tropics in the cases of those accustomed to a Temperate Zone or a colder climate—probably within 72 hours in most cases. This opinion has likewise been expressed by Colonel Siler after his study of blood pressures of a group of Army officers on duty in the Philippines.

4. The blood-pressure "accommodation" to the Tropics is marked in approximately 30 per cent of individuals. Varying degrees of the response were observed in approximately 50 per cent of our series. While the same forces are operative upon all individuals, it is evident that all do not show response by blood-pressure change because of prior conditions of disease or peculiar cardiovascular tendencies. It is very evident how arterial sclerosis, or any condition of hypertension, conceals a concurrent climatic factor of hypotension.

NOTE.—Since the preparation of this paper the writers have reexamined 16 of the officers previously examined after they had been in northern waters for more than six weeks. It was found that the systolic blood pressure was 9 millimeters higher than it was found to be on examination in the Tropics, a further evidence of the modification produced by climate. Through the courtesy of Dr. H. S. Diehl, health director of the University of Minnesota, the blood pressures of 18 foreign students from tropical countries were obtained. The average age was 24 years; the average systolic pressure 117; the average diastolic pressure 77. This is a distinctly lower systolic

pressure than other students at Minnesota have, as shown by studies made by Diehl and Sutherland and published by them in the Archives of Internal Medicine for August, 1925. The work of Mukherjee and de Almieda on basal metabolism in the Tropics is also significant in this connection, as they show there is a reduction below Temperate Zone standards. This is a parallel finding to the writers' experience with blood pressure. There is evidence also that a slight leucopenia is normal in the Tropics; that there are alterations in the blood chemistry and other changes in physiological activities that constitute physical findings tending to substantiate the hitherto widespread belief that the whole organism is strongly affected by climate. The subjective sensations that largely have led to this belief now seem to be supported by many more objective findings than have previously been noticed. There is great need of additional research in this direction.

DRESSING STERILIZERS WITH SPECIAL REFERENCE TO TEMPERATURE, PRESSURE, AND CHAMBER AIR EXHAUSTION DURING THE PROCESS OF STERILIZATION¹

By JOHN HARPER, Lieutenant Commander, Medical Corps, United States Navy

The purpose of this article is to call attention to the fact that, so far as dressing sterilizers are concerned, chamber pressure is not always a reliable index of sterilization.

The general impression, undoubtedly based on pressure-temperature tables given in many books discussing sterilization by means of steam under pressure, is that when the chamber pressure gauge registers a given pressure the temperature throughout the contents of the chamber corresponds to the normal temperature of saturated steam at that pressure. For example, 20 pounds (pounds per square inch) chamber pressure is accepted as meaning the temperature of approximately 260° F. within the chamber.

Recent tests carried out at the United States Naval Medical School and the work of Benton and Leighton, and perhaps others, have definitely demonstrated that under certain conditions this does not necessarily hold true.

To obtain and maintain the normal pressure-temperature relation during sterilization it is necessary that the chamber contain steam free from air, and in order to have this steam free from air it is necessary to exhaust and keep exhausting air from the chamber.

Failure properly to exhaust air from the chamber results in variation from the normal pressure-temperature relation, namely, lower temperatures at the various pressures, for the reason that we do not have steam alone, but varying mixtures of air and steam under pressure.

¹ From the laboratories of the United States Naval Medical School.

Manufacturers of dressing sterilizers, realizing the importance of air exhaustion from the sterilizer chamber, have devised various methods for its accomplishment. The usual method is by means of an outlet situated in the lower, front part of the chamber, which is controlled by a valve known as the chamber-drain valve. This valve incidentally serves another important purpose, that of draining off water of condensation. To eliminate the human factor in operating this chamber-drain valve, which if opened too wide causes unnecessary loss of steam, a steam trap can be attached. For the same reason some sterilizers are made with a small permanent opening just above this valve, the size of the opening having been regulated to allow proper air escape with minimum loss of steam.

Another, and apparently an excellent method, makes use of the vacuum principle for the immediate withdrawal of a large proportion of air. The air remaining should be taken care of by the chamber-drain valve throughout the process of sterilization.

The type of sterilizer used in the Medical Department of the Navy is constructed to use this method, although it can be operated without using the vacuum principle if so desired.

As a rule manufacturers issue with each sterilizer printed operating directions, but experience and investigations have shown that in many instances their directions, particularly those in regard to operating the chamber-drain valve, are frequently misinterpreted, with the result that this valve is incorrectly operated.

Two incorrect methods of operation are (1) chamber drain valve not opened at any time during the process of sterilization and (2) chamber drain valve not opened until the chamber pressure reaches 20 pounds or whatever pressure it has been decided upon to maintain.

As this service is mainly interested in the jacket-vacuum type of sterilizer the following data and conclusions will be confined to that type of apparatus unless otherwise stated.

The sterilizer under test had a chamber 20 inches in diameter by 28 inches in length (inside measurement); chamber drain outlet in lower front part of chamber with valve attachment; was gas heated; and had a generator capacity, when water in gauge glass was one-half inch from top, of 6,650 cubic centimeters. The safety valve was set to blow at 25 pounds pressure, and the gauges on jacket and chamber were calibrated at the Bureau of Standards before the test. The results of calibration of these particular gauges showed that their readings could be accepted as correct for the purpose of the following tests.

The test load consisted of 21 packages, each containing one dozen "Blue Center Huckaback Towels No. 5331-A," folded to give package approximately the dimensions 9 by 9 by 3½ inches. Total

weight averaged 37,600 grams (83 pounds). Packages were placed in three tiers, flat side up, with one package on end on each side of each tier. This type of load was used for the following purposes: (1) To secure a uniform and maximum load; (2) to secure uniformity in placing cultures of bacteria; (3) to determine the total amount, and the individual positions giving the greatest and least amount, of moisture (Chart 1).

The temperatures were obtained by means of a calibrated copper-constantan thermocouple which was placed in the center of a package centrally located in the load in the chamber. The cold junction of the thermocouple outside of the sterilizer was kept at 32° F. by means of a thermos bottle containing ice and the readings were taken with a Leeds and Northrop potentiometer indicator.

In connection with the work on temperatures appreciation is expressed here for the invaluable assistance given by W. F. Roeser, of the Bureau of Standards.

Approximate temperature equivalents were taken from Stitt's Practical Bacteriology, Blood Work and Animal Parasitology, seventh edition, and are considered sufficiently accurate physically for the purpose of these tests.

Table 1 shows the marked variations from the normal pressure-temperature relation obtained when the sterilizer was operated by one incorrect method, namely, after producing a chamber vacuum of 10 pounds per square inch below atmospheric pressure the chamber drain valve was kept closed until the chamber pressure reached 20 pounds.

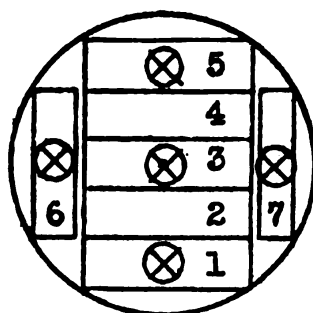
TABLE 1

Chamber pressure, pounds	Approximate temperature, equivalent	Temperature, center of load, trial 1	Temperature, center of load, trial 2	Temperature, center of load, average
	° F.	° F.	° F.	° F.
5 pounds.....	226	74	75	74.5
10 pounds.....	240	78	78	78
15 pounds.....	250	103	95	99
20 pounds.....	260	149	154	151.5
After 30 minutes at 20 pounds.....		250	245	247.5

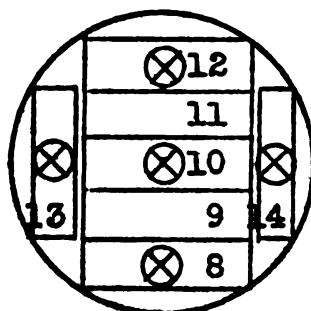
Table 2 shows the relatively normal pressure-temperature relation obtained when the sterilizer was operated correctly, namely, after producing a chamber vacuum of 10 pounds per square inch below atmospheric pressure and allowing the pressure gauge to return to zero the chamber drain valve was cracked and kept cracked until the beginning of the terminal vacuum drying step.

LOCATION OF PACKAGES AND CULTURES IN STERILIZER.

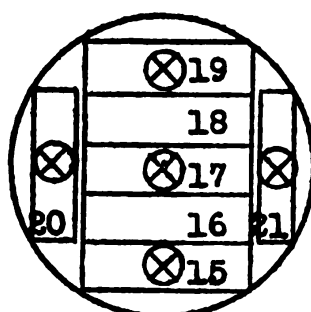
Load #1



Back



Center



Front

⊗ Location of Cultures
(1-21) " " Packages

Chart 1

TABLE 2

Chamber pressure, pounds	Approximate temperature equivalent	Temperature, center of load, in test
	° F.	° F.
5 pounds.....	226	231
10 pounds.....	240	240
15 pounds.....	250	250
20 pounds.....	260	259
After 30 minutes at 20 pounds.....		259

Table 3 gives the temperatures at the various pressures when the sterilizer was operated in a manner similar to the operation of the nonvacuum type, accomplished by omitting the vacuum steps and keeping the chamber drain valve cracked the entire time steam entered the chamber.

TABLE 3

Chamber pressure, pounds	Approximate temperature equivalent	Temperature, center of load, in test
	° F.	° F.
5 pounds.....	226	210
10 pounds.....	240	240
15 pounds.....	250	248
20 pounds.....	260	258
After 30 minutes at 20 pounds.....		258

Table 4 gives the temperatures in a package centrally located and in a package in the center bottom of the chamber when a sterilizer was operated correctly on the nonvacuum principle. This trial was run to note the difference in temperature in two different locations in the sterilizer chamber.

TABLE 4

Chamber pressure, pounds	Approximate temperature equivalent	Temperature, center of load, in test	Temperature, center of bottom, in test
	° F.	° F.	° F.
5 pounds.....	226	216	205
10 pounds.....	240	242	238
15 pounds.....	250	253	250
20 pounds.....	260	259	258
After 30 minutes at 20 pounds.....		260	260

Table 5 gives the difference in temperatures at various time intervals from the time steam entered the chamber, in center of load, with a sterilizer of the jacket-nonvacuum type and with a sterilizer of the jacket-vacuum type.

TABLE 5

Time, minutes	Tem- perature, center of load, non- vacuum type	Tem- perature, center of load, vacuum type	Time, minutes	Tem- perature, center of load, non- vacuum type	Tem- perature, center of load, vacuum type
	° F.	° F.		° F.	° F.
0.....	74	80.5	70.....	242	242
10.....	75	84	80.....	248	247
20.....	86	99.5	90.....	254	252
30.....	130	164	100.....	259	259
40.....	185	220	110.....	259	259
50.....	219	233	120.....	259	259
60.....	236	236	130.....	259	259

It will be noted that the vacuum type gives higher temperatures in the first 50 minutes, which may be explained by the vacuum causing a more rapid and complete removal of air from the load in the chamber, thus resulting in a more rapid and complete penetration of steam.

In addition to temperature measurements biological and moisture tests were made.

Biological test.—Threads were impregnated with material from a culture of *Bacillus subtilis* containing spores. These threads were placed in the center of packages in various positions in the sterilizer. After sterilizing at 20 pounds pressure for 30 minutes the threads were removed and placed in fermentation tubes containing dextrose broth and observed for growth for a period of one week. At the same time threads similarly treated but not sterilized were used as controls. (Chart 1.)

No growth occurred after sterilizing at 20 pounds chamber pressure for a period of 30 minutes in any of the previously mentioned tests.

Moisture test.—The moisture content was determined by weighing the packages in the load before and after sterilization. The average difference in weight in three trials was 1,203 grams. Facilities did not permit estimating the amounts of moisture during the various stages of sterilization; therefore these figures represent the change in the moisture content resulting from sterilization.

The positions of packages giving the greatest and least amount of moisture were: (1) Packages at extreme top, bottom, and sides retained the least amount of moisture; (2) packages in upper middle, middle, and lower middle retained the greatest amount of moisture; (3) packages in back tier retained the least amount of moisture; (4) packages in front tier—next to the door—retained the greatest amount of moisture.

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CONCLUSIONS

1. Chamber pressure is not always a reliable index of sterilization.
2. Removal of air from chamber is one of the most important features in obtaining proper sterilization.
3. Obviously, producing a partial vacuum at the beginning of sterilization expedites the removal of air from the chamber.
4. Since it has been shown that when a sterilizer is incorrectly operated the temperature may not correspond to that of steam at the indicated pressure, and since the temperature is the sterilizing factor which is required, it would seem that dependable temperature indicators should be supplied.
5. Temperatures in packages in center and bottom of load, when a sterilizer is operated correctly, are approximately the same at 10–15–20 pounds chamber pressure.
6. Sterilization at 20 pounds pressure for 30 minutes, provided the temperature is that corresponding to the pressure, namely, approximately 260° F., should be sufficient for routine sterilization of surgical dressings.
7. Dressings sufficiently dry for practical purposes can be obtained when a sterilizer is properly operated.

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CALCIUM HYPOCHLORITE FOR LYSTER BAGS

By E. M. STEGER, Lieutenant, Medical Corps, United States Navy

"WATER NOT KNOWN TO BE PURE WILL BE CHLORINATED"—FIELD SERVICE REGULATIONS:
1913

The Lyster bag may be regarded as the completed evolution of the goatskin water bag of Gunga Din. Its faucets and its rubber lining, its brass eyelets and lanyards for slinging, and its accessories of Lyster tubes for sterilization are a long way in advance of the other's goatskin and bit of twisty rag which Mr. Kipling states was Din's maximum of field equipment. The bag is a finished product; it is the tubes of calcium hypochlorite that have been studied with a view to correcting observed deficiencies.

Some of the tubes are made of thick glass and are not easily broken. Much of the chemical may be lost through the necessary violence. Bleaching powder does deteriorate in the tubes, gas accumu-

lating, its liberation when the tubes are opened scattering glass and powder after the manner of a miniature shell burst.

Calcium hypochlorite or bleaching powder, the so-called chloride of lime, is formed when chlorine is passed over lime. It is not one compound but contains several. Turneaure and Russell (1) state that it constitutes 65 per cent of the total mixture and will deliver about 30 per cent of chlorine. The use of this reagent is based on the same principle as is the use of liquid chlorine for its bactericidal action in drinking water supplies. It is usually held that hypochlorous acid is formed, oxygen in the nascent state being liberated in the reaction. This oxygen is the immediate germicide. For field service the reagent is placed in brown glass containers, sealed by heat, and usually known as Lyster tubes. Ford (2) states that they contain 1 gram of the powder, and it is intended that the contents of a tube will be added to a bag of water, about 40 gallons, furnishing 2 parts of available chlorine to 1,000,000 parts of water. Though the tubes are said to contain 1 gram of calcium hypochlorite, apparently a considerable margin of safety is provided, for it will be seen from Table 1 that the weight of 1 gram is often exceeded. However, from the sudden release of gas upon breaking deteriorated tubes, much less than a gram of powder may be obtained. It is advisable after breaking a tube to make the contents into a paste, using a small container such as a canteen cup, then to thin the paste by the addition of more water before finally stirring it into the bag. Thirty minutes are allowed for sterilization.

The study of the tubes and their contents was undertaken that there might be ascertained—

- (a) A more satisfactory method of opening the tubes;
- (b) The amount of the reagent recoverable after opening tubes by a selected method;
- (c) The available chlorine present in samples collected, and which had been issued or were stocked for issue.

The recollection of a simple apparatus seen in use some years ago for opening tubes containing suture material assisted in devising the present one. Briefly, the method offered is as follows: Two spent cartridge cases of service rifle ammunition are cut off just above the neck, the primers are extracted, and the vents enlarged by reaming, then connected with a short length of cord appropriately knotted on either side of each of the vents. Besides the obvious use of keeping the cups together and facilitating handling, by swinging one of the cups and striking it sharply against a metal surface, such as that of a bucket, the broken and impacted portions of a tube may be dislodged from a cup after the device has been used to open a tube. The tube of calcium hypochlorite that is to be opened has a cup thrust over each end, leaving the

file mark exposed. The cups and tube are then held over a canteen cup or other suitable receptacle containing an ounce, more or less, of water. Force is applied as in breaking a stick in the hands.

The amount of calcium hypochlorite ordinarily recoverable by opening with these cups was estimated as follows: The tube was opened a short distance above a sheet of official letter paper and the quantity remaining on the paper after removing particles of glass was transferred to one of the weighing pans of a pocket assay balance. More powder is collected in the laboratory than would be in the field, owing to the absence of wind and the use of a larger collecting surface. Naturally, in compiling the results of weights for a table more pains would be taken to gather up all the small particles.

TABLE 1.—Data relating to amount of powder recovered from tubes

Source	Dealer	Filled	Burst	Amount
				<i>Milli grams</i>
Depot.....	X.....	Jan. 2, 1925	None.....	1,040
Do.....	X.....	Aug. 20, 1924	do.....	1,145
Anti AC.....	Y.....	Feb. 21, 1924	Slight.....	960
10 rgt.....	Z.....	Aug. 13, 1923	None.....	1,015
QM 5 rgt.....	(1)	(1)	Moderate.....	870
QM 5 rgt.....	(1)	(1)	Violent.....	710
QM 5 rgt.....	(1)	(1)	do.....	710
QM 5 rgt.....	(1)	(1)	do.....	820
77 5 rgt.....	(1)	(1)	Slight.....	1,150
QM 5 rgt.....	(1)	(1)	Violent.....	500
QM 5 rgt.....	(1)	(1)	Moderate.....	975
45 5 rgt.....	(1)	(1)	Slight.....	970
QM 5 rgt.....	(1)	(1)	do.....	1,290
QM 5 rgt.....	(1)	(1)	do.....	1,130
Depot.....	X.....	Jan. 2, 1925	None.....	900
Do.....		(Small tube, practically none lost.)		
Do.....	X.....	Jan. 2, 1925	Slight.....	1,210
Do.....	X.....	do.....	None.....	1,000
Do.....	X.....	do.....	do.....	1,270
Do.....	X.....	do.....	Slight.....	930
Do.....		(Small tube.)		
Do.....	X.....	Jan. 2, 1925	None.....	1,080
Do.....	X.....	do.....	do.....	885
Do.....		(Small tube.)		
Do.....	X.....	Jan. 2, 1925	None.....	1,315
Do.....	X.....	do.....	do.....	1,170
Do.....	X.....	do.....	do.....	1,235

. 1 Unknown.

The assays for available chlorine were made according to the method of Penot, following in most respects a modification of that method outlined by Lelean (3). This modification is, in substance, as follows:

As bleaching powder is originally impure and is liable to lose chlorine if exposed to the air, samples should be examined from time to time. The results of the assays are expressed in terms of the chlorine found in the powder. The combining weights show that there should be 71 parts of chlorine in 127 parts of pure calcium hypochlorite, which, expressed as a percentage, is 56. Lelean states that the figures for the commercial powder run from 30 to 35 per

cent, but that it should not fall below 30 per cent, and this standard is the one usually accepted.

Bleaching powder when dissolved in water breaks up into chloride and hypochlorite of calcium.



The calcium hypochlorite parts with its oxygen in the presence of an alkaline solution of arsenious anhydride with the formation of arsenious pentoxide.



One molecule of As_2O_3 thus requires for its oxidation the oxygen contained in two molecules of hypochlorite. Four atoms of chlorine are components of these molecules. A known weight of arsenious anhydride is added to a known weight of calcium hypochlorite until all of the oxygen from the calcium hypochlorite has been abstracted. From the ascertained weight of arsenious anhydride required in this process the chlorine in the known weight of calcium hypochlorite can be estimated on the principle that one molecule of arsenious anhydride is equivalent to four atoms of chlorine. The proportional estimated weight of the chlorine to that of the weight of the calcium hypochlorite may then be represented as a percentage.

These reagents will be necessary: First, a standard alkaline arsenite solution—4.95 grams of arsenious acid (anhydride) are dissolved in a liter of water; 25 grams of sodium carbonate are then added. Solution should be effected on a water bath or by immersion of the flask in boiling water. The second requisite is the solution of the calcium hypochlorite that is to be assayed. One gram of the powder taken from one or more tubes should be rubbed up with water in a small mortar, reduced to a fine suspension, and washed into a volumetric flask, marked to contained 100 mils, by the successive additions of small quantities of water up to the mark. The third reagent is starch and potassium iodide papers. If an oxidizing agent be brought into contact with these papers, a blue color is produced.

With a transfer pipette place 10 mils of the suspension of calcium hypochlorite in a beaker, and from a burette run in the standard solution of arsenious anhydride until the contents of the beaker fail to produce a blue color when brought into contact with a starch and potassium iodide paper. A glass rod is used to make this transfer from beaker to paper. Before starting the titrations a row of the test papers may be attached to the edge of the laboratory desk with friction or adhesive tape. The end point is reached when blue no longer appears. If deterioration is not

anticipated, 6 or 7 mils of the arsenious acid solution may be run in at the start. Or, a mil at a time may be used and, when the end point has been passed, a second titration made with tenth mil additions after the greatest number of mils that failed to reach or pass the end point has been added. Each mil used represents 3.55 per cent of chlorine in the calcium hypochlorite examined.

The molecule of arsenious anhydride has a combining weight of 198 and is equivalent in this reaction to four atoms of chlorine. The sample of calcium hypochlorite taken at the beginning of the assay weighed 1 gram, and one-tenth of the total solution was used, hence there is one-tenth gram or 100 milligrams in the titration beaker. From this it follows that in the neighborhood of 9 mils of the solution of arsenious acid will be required to reach the end point in samples with a standard chlorine content.

After assays had been made of single tubes from different lots stocked by the quartermaster, the results of which are set forth in Table 2, 1 gram of powder from pools of 10 tubes of each lot was assayed, with the results shown in Table 3.

TABLE 2.—*Data relating to assays of single tubes*

Dealer	Filled	Per cent chlorine
Z.....	Aug. 13, 1923.....	18.315
X.....	Jan. 2, 1925.....	30.53
X.....	do.....	29.11
Y.....	Feb. 21, 1924.....	17.25
Y.....	do.....	20.09
X.....	Jan. 2, 1925.....	26.575

TABLE 3.—*Data relating to assays of pooled lots*

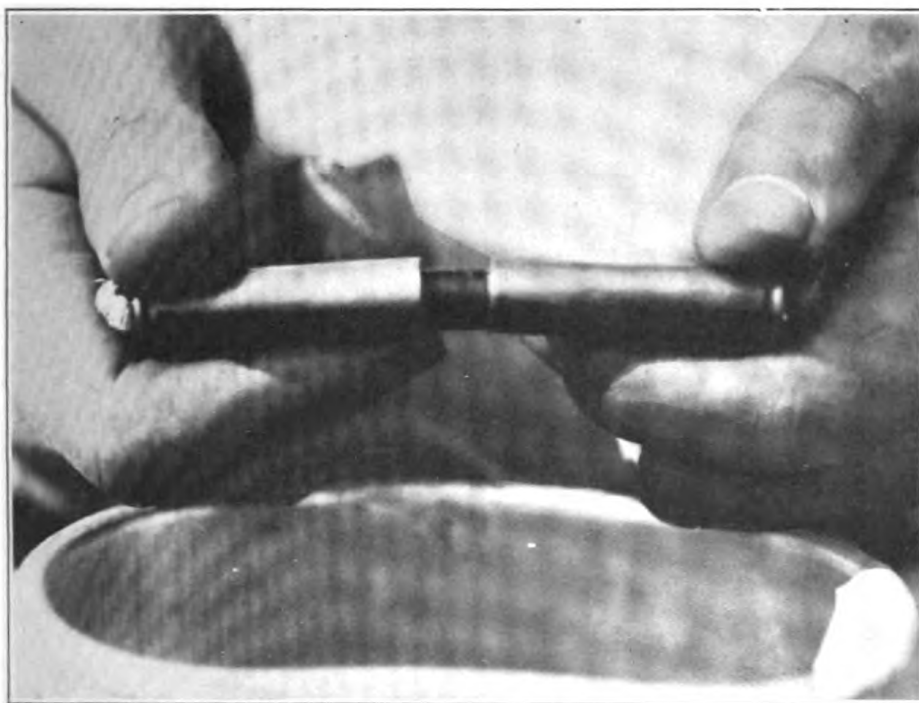
Dealer	Filled	Per cent chlorine
Z.....	Aug. 13, 1923.....	12.375
X.....	Aug. 20, 1924.....	25.205
Y.....	Jan. 16, 1924.....	19.17
Y.....	Feb. 21, 1924.....	21.3
(1).....	(1).....	18.105

¹ Unknown.

CONCLUSIONS

A satisfactory opening device can be improvised without cost and with small effort.

Under the more favorable conditions of the laboratory, when an explosion occurs the loss amounts roughly to one-third of the contents. It was noted that most of the tubes upon opening which no explosion occurred contained more than 1 gram.



72-1

FIG. 1.—OPENING LYSTER TUBE OVER CANTEEN CUP



FIG. 2.—LYSTER BAG IN CAMP OF MARINES

72—2

Calcium hypochlorite, even when packed in sealed brown glass tubes, will not retain 30 per cent available chlorine indefinitely. After one year from the date of filling tubes the loss was roughly one-third and after two years, approximately one-half.

Three tubes for two after the lapse of one year and two for one after the expiration of two years should be the ratio of substitution. The use of additional amounts of the powder may render the water unpalatable but is not actually harmful (aside from causing drinking from unchlorinated sources), and their issue in an emergency may be considered.

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THE USE OF MODIFIED MILK IN INFANT FEEDING

By W. H. SHORT, Lieutenant Commander, Medical Corps, United States Navy

The subject of a proper diet for infants is a serious one at times for the families of the Navy personnel. Many families travel extensively. After a family has made a change of station a mother oftentimes continues to sustain her baby on a modified-milk formula prescribed by a physician in the city in which she last resided, though she is no longer in communication with that physician. Some mothers may not seek advice often enough regarding changes in the formula, though a physician be available. Others do not consult a physician so long as the infant appears to be in good health, but use proprietary foods with the directions for infant feeding printed on the label of the container. In these directions the quantity of the ingredients used in the formulas varies only according to the age of the child. As a result the baby may possibly be fed in accordance with a formula which does not provide sufficient nourishment, or too much food may be given and digestive upsets will occur, with possibly a food injury. Again, an essential article of diet may be withheld unknowingly and disease may ensue.

Just recently this writer had occasion to be called in attendance upon an infant who presented such pronounced signs and symptoms of scurvy that the diagnosis was clearly evident and unmistakable. The patient was a bottle-fed infant 11 months old. The diet comprised condensed milk diluted with water, to which was added a

certain amount of a well-known proprietary baby's food. The mother of the child had given it every care and attention as to regularity of its daily feedings and personal hygiene. She had not consulted a physician prior to the development of the disease. The baby had always appeared to be healthy and had gained in weight, except for the two weeks previous to its coming under our observation. This infant would have continued in good health or, at least, would have been protected from the insidious disease, scurvy, if it had received in its daily diet one essential—vitamin C.

During the past 18 months at the out-patient department connected with the naval hospital, Newport, R. I., we have set aside certain hours on specified days of the week when mothers have been encouraged to bring their infants to us and obtain advice. The response has been gratifying. Many infants have been examined and prescribed for frequently at regular intervals, and changes have been made as required in their bottle formulæ.

An infant's bottle formula is based on the caloric requirements of the infant. The energy expended, the loss of bodily heat, and the growth of the child must be provided for by a sufficient intake, digestion, and assimilation of food. The value of this food is measured in terms of calories. A calorie is the amount of heat required to raise the temperature of 1 kilogram of water 1° C. Whether an infant is well fed and healthy or poorly nourished and, ultimately, diseased is determined by the amount of food it assimilates according to its caloric needs.

In addition to food for replacement and growth there are substances in the diet which, per se, have no caloric value but are essential. These substances are water, salts, and vitamins. Cow's milk meets all these requirements for an infant's diet, but, until the infant is about 8 months of age, the milk must be modified. By modified milk is meant milk that has had some ingredient added to it or subtracted from it so as to change its composition from that which it was originally when taken from the cow.

Mother's milk is the ideal food for infant feeding. When, for any reason, it becomes necessary to change to another food, cow's milk in some form is probably the best substitute. Though cow's milk is excellent for the offspring of the cow it is not a food for very young infants, unless it be modified so that its percentages of proteids, fats, and carbohydrates are adapted to the varying requirements of the infant.

The composition of human milk and cow's milk is practically the same, but the proportions of the ingredients differ. Carter et al. (1) state the average composition of human milk and cow's milk as follows:

	Water	Protein		Fat	Lactose	Salts
		Caseinogen	Albumen			
Human milk.....	88.5	1.2	0.5	3.3	6.0	0.2
Cow's milk.....	87.1	8.0	.53	3.7	4.8	.7

There are three important proteins in milk—caseinogen, lactalbumin, and lactoglobulin. The caseinogen of woman's milk constitutes one-third of the protein content; the caseinogen of cow's milk constitutes five-sixths of the protein content (2). The fat content of human milk is practically the same as that of cow's milk. Human milk fat has but 2.5 per cent fatty acids, whereas cow's milk fat has 27 per cent. Human milk contains more sugar and less salts than cow's milk. The sugar in both human and cow's milk is the disaccharide lactose. In digestion it yields galactose and glucose. It is not so sweet nor so soluble as cane sugar. The salts of milk consist of combinations of calcium, magnesium, sodium, potassium, and iron, with the acid radicals of hydrochloric, sulphuric, phosphoric, and citric acids.

Milk also contains vitamins A, B, and C. The last is very unstable. Vitamins are materials essential to the normal functions of the body. When they are absent, pathological changes result. There are four types—*Vitamin A*, protective against xerophthalmia; *vitamin B*, protective against beriberi; *vitamin C*, protective against scurvy; and a vitamin whose absence results in rickets. This vitamin may be fat-soluble *vitamin D*, as Levine (2) states that it is probable that vitamin D has antirachitic powers through its ability to prevent excessive loss of the salts involved in rickets.

Most infants, from about the age of three months, will thrive on cow's milk diluted with water, to which sugar has been added. Often even a younger infant will thrive on this mixture. When this formula is prescribed for the first time, it is well to allow a less amount of each ingredient of the mixture than the caloric requirements of the infant demand. The ingredients milk and sugar may then be increased gradually to the full caloric needs after the infant has established a tolerance.

When it has been decided to increase the bottle formula, both milk and sugar should not be increased the same day. Possibly a practical routine is to increase the milk 1 ounce daily until the young infant receives the full quantity of milk desired. The sugar is then increased about one teaspoonful every two or three days until the full amount prescribed is being taken. In this manner the tolerance of the infant is increased slowly, and, should a digestive disturbance

occur, we may have a good idea as to whether the milk or sugar has been the cause.

Cow's milk modified by the addition of water and sugar should conform in percentage composition to human milk, within certain limits. For young infants the percentage of proteids and fats in cow's milk should be reduced by the addition of water. Allowing an average of 3 per cent protein for cow's milk, a formula containing equal parts of milk and water will reduce the amount of protein to 1.5 per cent. According to Bosworth's (3) citation from Holt and Howland's *Diseases of Infants and Children*, an average infant of three months of age will digest 1.75 per cent protein, an infant four months of age will digest 1.90 per cent, an infant of five months of age about 2.10 per cent protein. So that the older a baby is, the better is its digestion for protein, and, consequently, its bottle formula requires less water to dilute the milk.

Fats in cow's milk are very difficult for an infant to digest. Although when the composition of cow's milk is compared with human milk, the percentage of fats is about the same in both; it is better to reduce the fats in cow's milk by diluting almost as low as the percentage of proteids.

The percentage of sugar (lactose) in cow's milk is less than in human milk. Diluted cow's milk contains a much smaller percentage, hence it is necessary to add an amount of sugar to a diluted milk formula in order to bring the sugar content up to that of breast milk. Though sugar is an essential article of diet, too large a quantity may cause a sudden and severe digestive disturbance.

Proteids are necessary in food to replace the continuous nitrogenous waste of the cells of the body. Fats save the nitrogenous waste and allow the proteids to be used for the purpose of bodily growth and nutrition. Sugar supplies heat and energy for the body. It assists in preserving the proteids and fats for the needs of the body. Without the addition of sugar in some form to the bottle formula it is difficult, if not almost impossible, for a very young infant to gain in weight and thrive.

The form of sugar which appears to be of value, which we have found in our cases to be beneficial, is dextrimaltose, though cane sugar may be used to advantage in the formula of many infants who have normal digestion. Dextrimaltose (Mead, Johnson & Co.) is marketed in three forms. Each form contains chiefly maltose and dextrans. In addition, No. 1 contains sodium chloride, No. 2 is plain (with no salt), and No. 3 contains potassium bicarbonate, 3 per cent. The latter assists in correcting any tendency to constipation, and also serves to neutralize any excessive amount of phosphoric acid which is present in cow's milk. In this manner digestion

of food is aided and an excoriated condition of the buttocks, a very prevalent condition in young infants who are on a modified milk formula, is prevented entirely or to a great extent.

Cow's milk is especially rich in calcium and phosphorous. These salts are in excess of the infant's requirements even when the milk has been modified. Most of this excess is eliminated through the feces as insoluble calcium phosphate and calcium soaps. These soaps may be the cause of constipation. The mineral salts are of great importance in infancy on account of the rapid growth of the skeletal system. They are also necessary for the blood and digestion, assisting in absorption of food and in excretion.

Since the preparation of an infant's formula is based on the infant's caloric requirements, the caloric value of each ingredient entering into the formula must be known. The following table from Dennett (4) gives the caloric value of some of the foods used in infant feeding:

1 ounce of milk (4 per cent fat)-----	equals 20 calories.
1 ounce of milk (3 per cent fat) (obtained after skimming 2 ounces off a quart bottle)-----	equals 17.5 calories.
1 ounce of milk (2 per cent fat) obtained after skimming 4 ounces off a quart bottle)-----	equals 15 calories.
1 ounce of sugar (any kind of sugar)-----	equals 120 calories.
1 ounce of flour (by weight)-----	equals 100 calories
1 ounce malt soup extract (by weight)-----	equals 90 calories.
2 scant tablespoonfuls of malt soup extracts-----	equal 1 ounce by weight.
2 level tablespoonfuls of cane sugar-----	equal 1 ounce by weight.
3 level tablespoonfuls of milk sugar-----	equal 1 ounce by weight.
4 level tablespoonfuls of dextrimaltose-----	equal 1 ounce by weight.
4 level tablespoonfuls of flour-----	equal 1 ounce by weight.

(Tablespoons to be leveled with a knife.)

Knowing the caloric value of the food that goes to make up the formula, the question of the quantity of the food for the caloric needs of the infant must be determined. Ordinarily an infant requires, in 24 hours, from 40 to 65 calories per pound of its body weight, according to age, weight, and general condition. An infant over four months of age that is fairly well nourished, sleeps well, and is not fretful will probably thrive on 40 or 45 calories per pound of body weight, while one who is under three months of age may require 50 to 60 calories. Emaciated, fretful, nervous infants need more calories per pound of body weight than well-nourished, fat babies who have a more placid disposition.

The heavier an infant is the less body surface it has in proportion to its body weight, and consequently it will not lose so much bodily heat as an infant that does not weigh so much. An infant weighing 20 pounds has not twice the body surface of an infant weighing 10 pounds. Accordingly, while an infant of 10 pounds may require 60

calories per pound, or a total of 600 calories in 24 hours, an infant weighing 20 pounds will require only 45 calories per pound to obtain its total of 900 calories in 24 hours.

The amount of fluid a baby shall receive at one feeding is usually determined by the age in months of the child. With the exception of exceedingly young infants, an average infant that is held in the mother's lap and fed with attention, slowly, will take 1 or 2 ounces more of the formula than it is months of age, the minimum amount at a feeding being 4 ounces and the maximum 8 ounces. That is, a baby 4 months old will take 5 ounces, one 6 months old will take 7 ounces or possibly 8 ounces. A normal child at 9 months of age should be on a cereal and vegetable diet in addition to whole milk and should drink out of a cup.

A healthy infant, weighing less than 12 pounds, usually receives seven feedings a day, until it is about 4 months of age, one bottle every three hours from 6 a. m. until 9 p. m. and one at 2 a. m. After the age of 4 months the 2 a. m. bottle is discontinued and a six-feedings-a-day schedule continued until the baby is about 6 months of age. As a matter of fact, very few infants demand the 2 a. m. feeding after they are older than 3½ months. If they persist, the 2 a. m. habit may readily be broken if so desired. After the age of 6 months a 4-hour daily schedule should be placed in effect. Some authorities adopt the 4-hour feeding plan as early as possible. Kerley (5) endeavors to place his feeding cases on a 4-hour interval, but does not force it, as he states that many young infants, particularly the small and very delicate, do better on a 3-hour plan if vomiting is not a factor.

The addition of sugar to the diet should be made with care, using small amounts at a time, after a sufficient interval has elapsed to note the effect each increase has on the general condition of the infant. As a general rule, 1 ounce of sugar will be well tolerated by infants under 10 or 11 pounds, and 1½ ounces by those above that weight. Any digestive disturbance or any abnormal constitutional condition, due to the use of sugar, will call for the curtailment of this article of diet immediately. In addition to the aforementioned cane sugar and dextrimaltose, lactose is often used by pediatricians.

In making up an infant's formula consisting of cow's milk modified with water and sugar, the age and weight and general condition of the infant are taken into consideration in order to determine the number of feedings in 24 hours, the quantity of food in 24 hours, and the amount of milk, water, and sugar in each bottle. *Example:* A well-nourished infant 4 months of age weighs 14 pounds. This infant will take 6 ounces of food at one feeding. Allowing 45 calories per pound of body weight, the infant's daily caloric requirement is

630 calories (body weight times calories per pound). At six feedings a day of 6 ounces each, 36 ounces will be taken in 24 hours. The amount of sugar, allowed according to age, will be $1\frac{1}{2}$ ounces. It is presumed that this infant's tolerance for sugar has been established; otherwise but 3 tablespoonfuls of dextrimaltose or $1\frac{1}{2}$ tablespoonfuls of cane sugar would have been allowed to begin with and this amount increased gradually to 6 tablespoonfuls of dextrimaltose or 3 tablespoonfuls of cane sugar. Six tablespoonfuls of dextrimaltose equal $1\frac{1}{2}$ ounces by weight and 3 tablespoonfuls of cane sugar equal $1\frac{1}{2}$ ounces by weight. As $1\frac{1}{2}$ ounces of sugar equal 180 calories, this leaves 450 calories to be provided for by milk (water has no caloric value). One ounce of milk equals 20 calories, and 450 divided by 20 equals $22\frac{1}{2}$ ounces of milk required. The infant is to take 36 ounces of fluid daily. As $22\frac{1}{2}$ ounces will be milk, then $13\frac{1}{2}$ ounces will be water. The formula prescribed is:

	Ounces
Milk.....	$22\frac{1}{2}$
Water.....	$13\frac{1}{2}$
Sugar (counted in caloric value but not in fluid quantity).....	$1\frac{1}{2}$

The addition of lime water to a formula, as a routine measure, should probably be discouraged, as alkalis serve to neutralize the free hydrochloric acid of the gastric juice. Levine (6) states that acid is indispensable for digestion of protein and that (2) free hydrochloric acid is the agent that unites with the buffer substances which are present in milk. When the gastric fluid has an acidity of less than pH 5 the casein may not be acted upon by the gastric secretions and may pass unchanged through the pylorus. In view of this, we believe that, as all digestion would then take place in the small intestine, only the intestinal digestive secretions acting, digestive disturbances would probably ensue eventually.

Occasionally an infant will not thrive sufficiently on a formula containing the ordinary forms of sugar. This is due probably to its inability to digest the sugar. In such cases these infants may do well on a malt soup formula in which dry malt soup stock is substituted for the ordinary sugar. We have used with good results Meads Dry Malt Soup Stock (Mead, Johnson & Co., Evansville, Ind.). Analysis:

	Per cent
Maltose and dextrin.....	47
Wheat flour.....	46.5
Potassium bicarbonate.....	1.5
Moisture.....	5

Young infants, under 10 or 11 pounds, usually tolerate 2 level tablespoonfuls of the dry-malt soup stock in 24 hours, while older infants take 2 to 4 level tablespoonfuls. About 2 scant tablespoon-

fuls of dry soup stock equal 1 ounce by weight, or 90 calories. Malt soup is prepared by mixing dry-malt soup stock with sufficient cold water to make a thin paste. Add the balance of the prescribed quantity of water, boil for 15 minutes over an open flame, stirring constantly to avoid burning. Then add the prescribed amount of milk, bring back to a boil and boil for three minutes, with constant stirring. After removing from fire, add sufficient boiled water to make up the loss of water by evaporation. Allow to cool and then divide into the required number of bottles for 24-hour feeding.

The use of dry milk is suggested under the following conditions: When it becomes necessary to wean young infants under 4 months of age from the breast, or for complementary or for supplementary feedings, or in digestional upsets in cases where modified milk in some form must be the principal article of diet, or in localities where the cow's milk is suspected of having been contaminated, or for purposes of travel.

When it becomes necessary to wean a young infant from the breast, we endeavor to make the change gradually from mother's milk to modified cow's milk, unless a rapid change from the mother's milk is imperative. The younger an infant is, the more susceptible it is to a digestional injury, unless it receives an amount of food quite accurately in accordance with its digestive capacity. Complementary or supplemental feedings of dry milk assist in establishing gradually a young infant's tolerance for modified cow's milk. By a complementary feeding is meant a feeding in which milk from the breast is taken for a certain length of time and then completed with an artificial feeding from the bottle. A supplemental feeding is one in which only milk from the breast is taken at a single feeding during certain specified hours, and only modified milk from the bottle is taken at other specified hours during the day.

Dry milk is prepared by evaporating the water from cow's milk. It retains all the elements of cow's milk, with the exception of water. It is readily made suitable for the infant by simply dissolving it in hot water. It is more digestible than raw cow's milk, and many infants thrive on it, even when allotted a less number of calories than are required when placed on a whole cow's milk, water, and sugar formula. Millard (4) states that he has fed some hundreds of infants on dry milk for prolonged periods and has yet to see one case of scurvy or rickets. We have used dry milk in many cases and the results have been extremely satisfactory.

There are many preparations of dry milk on the market. Dryco brand and Klim brand are broadly distributed. Dryco brand is made by the Dry Milk Co., Park Row, New York City. Analysis gives its composition as—

	Per cent
Protein.....	82
Fat.....	12
Lactose.....	46
Salts.....	7
Moisture.....	3

Eight level tablespoonfuls, 1 ounce by weight.

One ounce by weight, 127 calories.

One level tablespoonful equals 16 calories.

S. M. A. (synthetic milk adapted) is a synthetic dry milk made by the Laboratory Products Co., Cleveland, Ohio. It resembles breast milk, both physically and chemically, and is on the market in both a liquid and powder form. Each can of dry milk contains a measuring cup (1 tablespoonful). One measuring cup full of dry milk dissolved in 1 ounce of warm water has the following approximate composition:

	Per cent
Protein.....	1.3 -1.4
Fat.....	3.5 -3.6
Carbohydrate.....	7.3 -7.5
Ash.....	.25- .30
Water (about).....	87.65
	<hr/> 100.00

(pH 6.8 to 7.)

Caloric value, when the powdered milk is diluted with water (1 measuring cup full of powdered milk to 1 ounce of water), equals 20 calories.

Many writers concluded that the great number of low volatile fatty acids contained in cow's milk were the cause of digestive upsets and nutritional diseases, acute and chronic. Dr. H. J. Gerstenberger, professor of pediatrics in the Western Reserve University Medical School, accordingly, combined various animal and vegetable fats (2), tallow oil, tallow, cod-liver oil, coconut oil, and cocoa butter and prepared a synthesized fat that had the same saponification number, iodine number, Reichert-Meissl number, Polenske number, and the same melting point as the fat in breast milk. By its content of cod-liver oil it has antirachitic and antispasmodic properties.

The saponification number represents the amount of potassium hydroxide required to saponify 1 gram of fat. The iodine number is the value of iodine used to combine with oleic acid in milk. Oleic acid forms about 50 per cent of the nonvolatile fatty acids in human milk and gives human milk a lower melting point than cow's milk. The Reichert-Meissl number is the required number of cubic centimeters of decinormal potassium hydroxide necessary to neutralize the acidity of the distillate from 5 grams of fat. It indicates the amount of volatile fatty acids present in fat. Volatile fatty acids con-

stitute 2.5 per cent of the fat of breast milk and 27 per cent of the fat of cow's milk. The Polenske number represents the alkali required to neutralize the volatile fatty acids insoluble in water. The following table, given by Levine (2), indicates the difference between the fat of cow's milk and that of breast milk:

	Fat of cow's milk	Fat of woman's milk
Saponification number.....	220.0-241.0	206.08
Iodine number.....	26.0- 28.0	46.25
Reichert-Meissl number.....	24.0- 34.0	2.65
Polenske number.....	1.5- 3.5	1.65

We have used S. M. A. for a number of months past in two very difficult feeding cases with excellent results. When we were consulted in the first case, examination revealed marasmus, which undoubtedly was the sequel to a subacute nutritional disturbance brought on by overfeeding. The second case was that of an infant 3 weeks of age, who, when he first came under our observation, had an acute digestive disorder due to faulty feeding. The mother had never nursed this infant.

The use of certified milk in preference to Pasteurized milk is advised. We believed that, as a general rule, the cows from which certified milk is obtained probably receive better food and attention and their milk is guarded more carefully to protect it against being inoculated with bacteria. Ladd et al. (7) stated that, in a series of cases in which the use of raw certified milk gave much better results than the use of Pasteurized milk, "possibly the greater efficiency of certified milk over Pasteurized milk was due to the more exact and scientific feeding of the cows." It is essential that infants receive a milk containing very few bacteria. Milk that has not been handled carefully will contain dirt and possibly pathogenic bacteria. Even nonpathogenic bacteria that have very little effect on adults may be detrimental to infants.

Pasteurized milk may be reinoculated with bacteria in the process of handling. In this connection, Levine (2) relates an interesting and instructive account based on a report published by Shrader and Swenarton. (Shrader, J. H., and Swenarton, J. C.: Effects on infants of high pre-Pasteurization counts, *Am. Jour. of Public Health*, 1925, 15:427.) This report concerns the relation of the number of bacteria in pre-Pasteurized milk and the number of deaths from gastroenteritis in infants under 2 years of age, occurring in Baltimore during the years 1922, 1923, and 1924.

Dr. Mary Sherwood, director of the bureau of child welfare in the department of health, Baltimore, Md., called attention to the fact that in the city of Baltimore during the summer of 1922 there was a surprising and unaccountable increase in the mortality rate.

of infants under 2 years of age from gastroenteritis. Her investigation of the milk supply revealed that, although 98 per cent of the milk in Baltimore was Pasteurized, the average bacterial count of milk brought in for Pasteurization during 1922, 1923, and 1924 was higher than the bacterial count during 1921.

Shrader and Swenarton found that in the summer of 1922 the average bacterial count rose to ten or twelve million per cubic centimeter for pre-Pasteurized milk. In 1923 the count was not above 8,000,000, and in 1924 the bacterial count was about 2,200,000 per cubic centimeter. The peaks in the curves for bacterial count and mortality coincided. In 1922 the mortality rate for Baltimore for gastroenteritis was 58 per cent above the average rate for other American cities, in 1923 it was 39 per cent above, and in 1924 it was 80 per cent above the average for other American cities.

Milk for young infants, whether certified milk or Pasteurized milk, should be boiled. In this manner any harmful bacteria present are destroyed, and the milk is rendered more digestible. We have continued many infants on a boiled-milk formula for a considerable length of time and, from a clinical standpoint, they have thrived. They have gained in weight, and have been well-nourished, healthy babies in all respects.

When milk is boiled, it should be done in the following manner: Measure out the required number of ounces of water, pour it into a saucepan and bring it to an active boil. While boiling, pour in the required number of ounces of milk and bring it to a boil as rapidly as possible, stirring vigorously all the time so that a scum will not form upon the top. Boil actively for three minutes after it has once come to a boil. Take off the stove and stir vigorously for five minutes while cooling. Add sugar. Pour immediately into clean feeding bottles, using as many bottles as there are to be feedings in 24 hours, each bottle to contain the required number of ounces for one feeding when the whole is divided evenly among them. Stop up the bottles with a clean piece of absorbent cotton. Cool as quickly as possible. Place directly upon the ice until used. At each feeding time place a bottle in hot water, and heat to blood heat, testing the temperature on the skin of the flexor surface of the forearm. Never heat the bottle before it is time to feed the baby.

Milk that has been heated loses its protective power against scurvy. The antiscorbutic vitamin C is very unstable to oxygen at high temperatures. The effect of heating is to destroy most, if not all, of this vitamin. In fact the influence of oxygen upon vitamin C is so great that air alone may destroy its biologic efficiency. To counteract the effects on infants of the loss of this vitamin from the milk formula, orange juice must be given daily. About 8 a. m. and 4 p. m.

are practical times of the day. Orange juice has antiscorbutic qualities, owing to the presence of vitamin C. Strained orange juice may be given to a normal bottle-fed infant as early as 2 months of age. It is well to begin with about one teaspoonful diluted with water, and increase the amount one teaspoonful every week or 10 days until the juice of one whole medium-sized orange is being taken by the time the infant arrives at the age of 4 months. Orange is well borne by infants as a general rule. Should an infant prove to be an exception, and orange juice disagree, the juice from canned tomatoes may be given.

All bottle-fed babies who live in a northern climate are predisposed to rickets, a disease of faulty calcium and phosphorus metabolism (8). The predisposition to this disease exists during the entire twelve months of the year, but it is more pronounced during a period of about eight months, from October to the end of May. Hess (9) has demonstrated that the prevalence of rickets varies according to the seasonal intensity of the ultra-violet rays of the sun. During the summer months, when the rays are the most intense, rickets is not so prevalent as during late fall and winter months. Cod-liver oil should be administered to infants during the period October to May. Its antirachitic action, due to the vitamin it contains, consists in increased calcium assimilation and calcium conservation (10).

For young infants it has been our practice to recommend Mead's cod-liver oil; and for older children, either Patch's cod-liver oil (E. L. Patch & Co., Boston, Mass.) or Squibb's cod-liver oil (E. R. Squibb & Son, New York City). Cod liver oil may be taken in orange juice in the early morning hours. About 8 a. m. is a convenient time, also at 4 p. m. Heiman (8) calls attention to the fact that there is a quantitative element in the administration of the antirachitic vitamin just as there is in digitalis, and standardized cod-liver oil should be used as standardized digitalis is used, with the therapeutic dose carefully computed.

Every infant's general condition should be closely and constantly observed and the effect of its diet carefully considered. The manner in which an infant's digestive system responds to any change made in the bottle formula should be noted. The slightest indication on the part of the infant that the modified milk disagrees with it necessitates a thorough investigation, and the cause must be remedied at once. To avoid a possible digestive disorder, an infant's digestive system should be cultivated carefully and its tolerance for food increased slowly by degrees. It is believed that the aforementioned principles of infant feeding may be adapted to the preparation of modified milk for infants so as to fill their requirements

for food during their modified milk age, and thus bring them to the next stage in their infant life, where they may ingest raw unmodified milk, fruit, cereals, and vegetables.

SUMMARY

1. Cow's milk may be substituted for breast milk in infant feeding. Until an infant arrives at an age where it can digest whole cow's milk the milk must be modified.

2. Normal bottle-fed infants require a modified cow's milk formula in accordance with their caloric requirements. These requirements increase in proportion to the infant's bodily growth. As the caloric requirements vary from time to time an examination of the infant should be made at frequent intervals.

3. A modified milk formula is computed according to the caloric value of each ingredient entering into it. When it becomes necessary to change the formula, so as to give a larger quantity of food, the ingredients should be increased gradually and no two ingredients increased on the same day.

4. Dry milk is readily digested. It serves to increase slowly the tolerance for fresh cow's milk and may be used with advantage in complementary or supplemental feedings. Infants with digestive derangements are benefited by this product. Infants while traveling do exceedingly well on a dry-milk formula.

5. Certified milk is preferable to Pasteurized milk. All milk should be boiled. Milk which has been boiled is rendered more digestible and is protected from any possible contamination.

6. Orange juice should be given daily as an article of diet to replace vitamin C, which is lost when milk is heated.

7. During the period October to May in northern climates it is well to administer cod-liver oil for its antirachitic effect.

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AVIATION CRASHES AT PENSACOLA—1925-26

By J. D. BENJAMIN, Lieutenant, Medical Corps, United States Navy

There seems to be but one way to compare the safeness of aviation during the last year with previous years and that is by comparing the number of crashes that have occurred as well as the number injured and the number of fatalities. No other place appears to be so suitable for considering this question as the naval air station at Pensacola, Fla., because of the diversified kind of flying performed at that station. Work there includes green students under instruction, flying by instructors, advanced work, and refresher courses for former pilots.

The crashes at Pensacola for the three years from July 1, 1922, to June 30, 1925, were reported in the UNITED STATES NAVAL MEDICAL BULLETIN in January, 1926. During that time 90 crashes occurred at this station out of 52,584 hours of flying. This shows one crash for every 584 hours of flying. Twelve deaths occurred during that period, or one out of every 4,382 hours of flying. The greatest number of crashes occurred in August and September and the smallest number in November and December.

During the year from July 1, 1925, to June 30, 1926, 40 crashes occurred at the United States Naval Air Station, Pensacola. In 11 of these crashes 13 people were injured and 1 killed. This is explained by the fact that some planes carried two or more persons. In the other 29 crashes no one was injured. During the period there were 26,263 hours of flying on this station, so there was one crash for every 656 hours of flying. As members of the personnel were injured in 11 of the 40 planes which crashed, in 27 per cent of the crashes some one was hurt.

The mortality for the year was one death in 26,263 hours of flying. This is a marked improvement, for the previous three-year period showed one death in 4,382 hours of flying.

The NAVAL MEDICAL BULLETIN of January, 1926,¹ says, "The cause of a crash should come under one of four headings: (1) Fault of the pilot; (2) mechanical; (3) unavoidable; (4) unknown. (1) Under the 'fault of the pilot' are included such reasons as poor judgment, inexperience, landing with the wind, distraction, turning into field with dead motor, faulty piloting, and other causes definitely due to the pilot. (2) Under 'mechanical causes' are included motor

¹ Benjamin, J. D.: An analysis of aviation crashes. *U. S. N. Med. Bull.* 24; 1; p. 72.

failure, faulty construction of plane, propeller or other part of plane carried away, ignition failure. (3) 'Unavoidable causes' include collisions in the air due to another plane, landing quickly to avoid collision, fog, and weather conditions. (4) Under the heading 'unknown' are cases to which a cause can not be assigned—for instance, trying out a new type of plane and getting into a spin from which it is impossible to come out." In accordance with the above classification 25 of the crashes occurring during the past year were analyzed as to the causative factor. As usual, the pilot is the main offender. One crash was due to a wheel carrying away, causing the plane to nose over. This is listed under faulty construction, but might be due to the pilot picking out a poor landing field. Three were due to motor stalling and two to loss of flying speed. One crash was a collision in the air between two planes engaged in close combat or so-called "dog fighting." All of these may or may not have been due to the pilot's lack of experience. One plane crashed because it was tail heavy. This probably was due to faulty construction. Nine of these crashes may have been due to reasons other than the pilot. Out of 25, 16 were definitely shown to be due to the pilot. Probably 23 or 24 were due to the pilot, for the longer one is associated with aviation the more certain one becomes that safe flying depends in from 92 to 98 per cent of cases on the pilot.

During the year three of the crashing planes landed on buildings. One plane struck a brick building a glancing blow, then struck a church, and, finally, a fence and landed on the ground with one wing crumpled. The pilot walked out of the plane without a scratch. He soon afterwards resigned from the service. Another plane landed directly on the roof of a building on this station after spinning down from about 3,000 feet. The pilot showed some signs of concussion and a severe laceration of the leg. He completely recovered and was returned to flying status, but his heart was never in the game again and he was returned to general duty. A third plane crashed on the roof of an industrial building. Both the pilot and a passenger went to the hospital where they still are under treatment. This was the only crash of the three in which the occupants were severely injured.

Eight crashes have failure to recover from spin given as the cause. This, of course, is due to inexperience, which continual flying and time should correct. In one crash the student relinquished the controls and the instructor failed to take them in time. That crash is listed as due to inexperience, bad judgment, and carelessness. One pilot struck a tree in landing; another, a fence; another wrongly estimated his speed and overshot the field; while a fourth crashed because of a down-wind landing. All of these crashes were due to

inexperience. Probably inattention and distraction were strong factors.

Considering the above figures there seems to be little doubt that flying is becoming safer all the time. The crashes are fewer and when a plane does crash it is seldom that the pilot or passenger is seriously hurt. As has been shown there were only four people seriously hurt and one killed in 40 crashes in 26,263 hours' flying. One aviator's life was saved by a parachute. After colliding with another plane in the air he went over the side of the plane and opened his 'chute and made a safe landing in the bay. The occupant of the other plane failed to jump and was killed. Whether the pilot of the second plane did not jump because he was rendered unconscious by the collision will never be known.

The pilot material turned out after completing the course is undoubtedly better than heretofore. Four students who have crashed during the course have given up the course for some reason or other. In two of the cases the men admitted that they were not so keen about flying as they were before they crashed and requested to be relieved from flying. The other two did not express themselves.

From previous records it has been shown that during the fiscal year 1923, 111 students started training to become pilots at the naval air station, Pensacola, and 66 finished. In the year 1924, 95 students started training and 68 completed the course. During 1925, 176 started training and 87 were designated as naval aviators. During this three-year period 57 per cent of the students entering training were qualified as pilots. During the fiscal year 1926, 145 students started training and 77 finished, making 53 per cent who completed the course. There is a difference of 4 per cent between the years 1922-1925 and 1925-26. This difference is probably due to several factors, the first being that the student aviators are probably more thoroughly trained and the poorer material more carefully weeded out. Another factor is that the students who are ordered to Pensacola for training are not so carefully selected as in the past, for the classes are larger; there are not so many to select from, and, apparently, doubtful material is ordered down for instruction. This is proved by the fact that a number of the students for instruction have not had an aviation examination before reporting. Another factor is that students must qualify in landplanes as well as seaplanes before getting their wings. Some qualify in seaplanes but are dropped in landplanes. As a whole the present scheme is probably the best, for it means more seasoned and dependable aviators are sent to the fleet. A chain is only as strong as its weakest link and a flying formation is only as good as its poorest aviator.

Judging from the previous series of crashes (1922-1925) August and September were the most dangerous months, while February was the safest.

Age is certainly a factor in aviation. Out of six older officers only two qualified. No absolute figures on age as a qualification factor are available, but it is believed to be most important.

SUMMARY

The fiscal year 1926 in naval aviation at Pensacola was safer than the three preceding years, although there were 40 crashes, while in the three previous years crashes totaled 90, or averaged 30 a year. The ratio of crashes to hours of flying was smaller, as in the three preceding years one crash occurred in every 584 hours of flying, while during this past year there was one crash to 656 hours of flying. Only four fliers were seriously injured, all of whom will recover and one was killed in 26,363 hours of flying.

Aviation is evidently a young man's game. The younger the student aviator, within certain limits, the better his chance of qualifying. For new students about to enter training in naval aviation the younger the age the better. Thirty should be the maximum age. For qualified aviators it may be much older. This does not mean that an older man may not qualify; he just hasn't so good a chance as the younger ones.

The time of the year has very little to do with the crashes, except that in stormy seasons, flying activities have to be curtailed somewhat.

CLIMATIC BUBO

By W. H. WHITMORE, Lieutenant Commander, Medical Corps, United States Navy

Synonyms.—Tropical bubo, subacute inguinal lymphogranulomatosis; fourth venereal disease; nonvenereal bubo; subacute inguinal periadenitis; adenitis tropicalis.

Historical.—Climatic bubo has been discussed by various writers during the past 35 years and various theories advanced as to the etiology and the relation of the disease to other venereal infections. Climatic bubo, as a clinical entity, is of peculiar interest to the naval medical officer, as he is called upon not only to diagnose and treat the disease but also to decide whether it is of venereal origin or not. The disease apparently is not uncommon in the naval service. In the past five years at the naval hospital, Pensacola, Fla., there were 26 cases of inguinal bubo admitted as lymphadenitis; acute, inguinal (nonvenereal) and bubo, inguinal (nonvenereal), of which 11 were cases of climatic bubo. During the fiscal year 1925 in the entire Navy there

were 488 admissions for bubo, inguinal (nonvenereal), 265 readmissions, and 28 continued from the previous year, for a total of 18,005 sick days, with 37 cases carried over to the following year (1). If the proportion of climatic bubo as found in this hospital applies to the entire Navy, the importance of the disease is such that it should be recognized and classified as a separate and distinct clinical entity.

The chronic bubo was described in 1890 by Nélaton (2), who differentiated the disease from tuberculosis and described the characteristic intragangliar purulent foci. Godding (3) in 1896 and 1897 (4) reported cases and his methods of treatment; he emphasized the nonvenereal character of the cases he had observed during 20 years' service, and gave statistics for the British Navy from 1888 to 1894, during which time the yearly average for bubo was 733 cases; in the seven years 20 men were invalided from the service and 9 died "principally from exhausting suppuration from these buboes" (3).

Definition.—Climatic bubo is a distinct disease, characterized by inguinal bubo, a febrile course with malaise and moderate anemia, and a marked tendency to chronicity.

Etiology.—The disease has been considered as a nonvenereal infection, most frequently found in the Tropics, more prevalent among white men in the Tropics than in natives. It is not strictly confined to the Tropics, and may be found frequently in temperate climates. Although known as nonvenereal bubo, the disease is undoubtedly of venereal origin. Until the causative agent is identified the venereal nature can not be absolutely proved, but the circumstantial evidence is strong. The inguinal glands are always attacked; primarily, the glands above Poupart's ligament, and, of this group, the medial part; other glands, below Poupart's ligament, and retroperitoneal glands may show secondary involvement. The glands first attacked are those draining the genital organs, and the skin over the pubis. Bubo starting in other than the inguinal glands is not climatic bubo (3) (10).

The disease is most prevalent in males with few cases in females. It is most frequently found in young unmarried men. Destéfano and Vaccarezza (10) noted that the incidence of infection for sailors was highest in the lower ratings, and rare in the mates and officers; and attributed this to the careless venereal exposure of the inferior ratings and lack of cleanliness of the cheap prostitutes. In practically all cases of climatic bubo, a history of intercourse with prostitutes may be obtained. The development of the disease in a man and his mistress at the same time has been observed (10).

The initial lesion may be a small herpetiform ulcer, a "micro-chancr" (10), a balanitis, or a small intraurethral ulcer. A careful examination will often disclose a minute ulcer or scar in the

coronal sulcus, or a history may be obtained of a small "blister" or transient urethral discharge. The primary lesion may be insignificant and transient, and not even noticed by the patient, but very frequently a definite scar may be found. In the service it is difficult to obtain a history of the primary lesion on account of the misconduct feature of venereal diseases. The climate probably has some effect, in lowering the resistance of the individual to infection, as shown by the higher incidence in the Tropics and in summer months (9) (10). Cantlie is quoted as considering *B. pestis* the cause of the disease, but he was probably dealing with atypical cases of plague (9) (10). The cases reported by Heiner (8) in which gonococci were found were probably atypical cases of gonorrheal bubo.

The incubation period is from 10 to 30 days (5) (6) (9). Three recent cases gave a history of last exposure two, three, and four weeks before the onset of the bubo; one case had a chancroid, apparently mixed infection, a month before the onset of bubo.

Epidemiology.—The disease is endemic, although cases occur in groups, suggesting small epidemics. Many observers have noted that the disease is unusually prevalent in the West Indies, but cases develop in the Temperate Zones without any history of tropical residence. Three of my cases gave a history of last intercourse with prostitutes in places other than Pensacola—one in New York, one in Norfolk, and one in France.

Pathology.—The primary "microchancre" will show a loss of epidermis with subjacent infiltration of lymphocytes and plasma cells. In the deeper tissues a subacute inflammatory reaction, with perivascular infiltration and lymphatic dilatation (10).

Inguinal glands: In the early stages the glands are enlarged, with increased vascularity; on section they cut hard, and the germinal centers show up distinctly. In a more advanced stage the hypertrophy and congestion are marked; the glands have a purplish red color; when shelled out from the surrounding tissue they have a raw granular appearance, resembling acutely inflamed tonsils. Spear, in Butler's article (9), and others (10) have noted this typical appearance of the excised glands. On section the parenchyma of the gland has a raw, granular appearance; the germinal centers are prominent; microscopically, minute foci of necrosis are found in the germinal centers. In the advanced stage the parenchyma of the gland is grayish on section, and shows multiple small purulent collections, separated by hypertrophied gland tissue. These pus pockets may finally coalesce forming a single abscess. The periglandular tissue from the earliest stages shows a marked inflammatory reaction, with lymphocytic infiltration. With the spontaneous rupture of the puru-

lent foci, or incomplete surgical drainage, there is the development of dense scar tissue and characteristic multiple sinuses.

The pus obtained by aspiration or incision is whitish-yellow, inodorous, and very viscous; on microscopic examination a marked preponderance of lymphocytes is found; in some fields no polymorphonuclears may be seen. Prior to spontaneous rupture or secondary infection no organisms are found in the pus. After the gland is opened the ordinary pus organisms may be found. In case 9, below, several weeks after drainage was instituted pus aspirated from the deep glands showed no organisms and gave no growth on culture media. Attempts to inoculate animals with pus and gland fragments have been unsuccessful (10). In this hospital we found no organisms in smears from the aspirated pus, and there was no growth on the ordinary culture media.

Other lymph glands may show a slight enlargement, but this is not characteristic. There is a moderate secondary anemia which may become extreme in the prolonged suppuration.

Symptomatology.—The first symptom noted is usually pain and discomfort which frequently attracts attention to the slightly enlarged inguinal glands. One or both sides may be involved. The glands slowly increase in size, with increasing pain and malaise. There is usually some fever from the onset, generally not more than 100° F., often of a remittent type; the temperature may reach 103° or 104° F., especially with the onset of suppuration and the involvement of the deeper glands. Some of the cases with high temperatures may have a coexistent tonsillitis, malaria, or other complications. There is a moderate leucocytosis, with usually a marked relative lymphocytosis. This lymphocyte reaction is characteristic and diagnostic. The cases reported here averaged 31 per cent lymphocytes in the total counts made. There may be a slight eosinophilia, or eosinophiles may be absent. The red-cell count is normal, or slightly reduced in the early stages; there is a moderate secondary anemia after the first month. The course of the disease, if not modified by treatment, is essentially chronic. In some cases the bubo subsides without suppuration, but in the usual case there is a slow increase in size of the bubo, the periglandular tissues become more infiltrated, the bubo mass becomes fixed to the deep fascia, there are adherence and discoloration of the skin, multiple indefinite fluctuant areas appear, and there is finally spontaneous rupture with prolonged suppuration and drainage; with the formation of fistulas, dense, almost cartilaginous scar tissue develops and may lead to crippling deformities.

Diagnosis.—The disease is to be differentiated from chancroidal and gonorrheal bubos. The finding of the ordinary pus organisms or gonococci in aspirated pus rules out the climatic bubo. Hodgkin's

disease rarely shows primary inguinal involvement, is usually afebrile, with a characteristic blood picture. Where plague is endemic or epidemic, examination of gland juice will discover *B. pestis* in plague cases. Tuberculosis occurs rarely in the inguinal glands, and in these cases there is well-marked tuberculosis of other organs.

The slowly developing bubo, with periadenitis, moderate fever, moderate leucocytosis, and relative lymphocytosis; the absence of gonococcal, chancroidal, or syphilitic infection; the absence of organisms and preponderance of lymphocytes in aspirated pus or gland juice; the marked chronic course; and the typical appearance of the excised glands in operative cases, are diagnostic features of climatic bubo.

Prognosis.—With proper treatment the prognosis is good. The prolonged suppuration in untreated cases may lead to death from exhaustion or secondary infection.

Treatment.—Surgical treatment has usually been the method of choice, as it shortened the course of the disease; the complete excision of the infected glands is usually recommended. Surgical treatment is often unsatisfactory, as after an apparently complete operation the neighboring glands become involved and lead to prolonged drainage. While on duty in Santo Domingo I treated about 20 cases of climatic bubo. In some cases the entire gland mass was excised, and the wound sutured; about half of these healed by primary intention; in the others there was prolonged suppuration, but the course of the disease seemed much shorter than in those cases in which simple incision and drainage were done. Godding (3) advocated the use of arsenic internally, with evaporating lotions applied to the bubo, late incision of the abscess, with application of a powder of calomel, iodoform, and zinc oxide on the exposed glands. Recently Destéfano and Vaccarezza (11) have reported the use of antimony-potassium tartrate intravenously. They treated 72 cases with very good results. In most cases there was resolution of the bubo without suppuration; in some cases suppuration occurred during treatment, or was present when treatment was started; surgical drainage was necessary in a few cases, but all cases were improved by the tartar emetic treatment.

Tartar emetic treatment.—A sterile 1 per cent solution of antimony-potassium tartrate is used, starting with 5 cubic centimeters intravenously. The dose is increased to 10 or 12 cubic centimeters; from 6 to 15 intravenous injections are given at three or four day intervals. If the disease is not cured with the first series, another series of injections is given after a rest period of one or two weeks. This treatment has been used in only three cases in this hospital, but the results compare so favorably with those in other cases,

treated by surgical methods alone, that there is no doubt of the efficacy of the remedy. In case 9 the patient was in a critical condition, following prolonged suppuration and major operative procedures; and there was absolutely no sign of granulation tissue in the wounds. The second day after the first treatment there were healthy granulations starting in the wounds and the patient's general condition was noticeably improved. In case 10 the bubo on one side was excised before starting the tartar emetic; the remaining bubo regressed rapidly under treatment. He developed a recurrence before discharge from the hospital, and this yielded to a second course of the tartar emetic. In the three cases the pain was relieved after the first injection and the improvement in both the bubo and the general condition was immediately evident. There were no reactions to treatment other than nausea for an hour or two following the injection, a moderate temperature elevation, and increased discharge from the wound. There are apparently no contraindications to the use of tartar emetic.

SUMMARY

1. Climatic bubo is a definite clinical entity, due to an unknown infectious agent of venereal origin.
2. The course of the disease is chronic, characterized by inguinal bubos, unilateral or bilateral, with moderate fever and relative lymphocytosis.
3. The pus or gland juice aspirated shows no organisms, gives no growth on ordinary laboratory media, and contains a high percentage of lymphocytes.
4. The excised glands have a characteristic appearance, and on section show multiple foci of suppuration. Periadentitis is always present, and is marked in advanced cases.
5. The best treatment at this time is antimony-potassium tartrate, intravenously, with incision and drainage where indicated.

CASE REPORTS

Case 1: H. D. A. C-6741. Age, 22. Admitted April 17, 1923. No history of tropical service; no history of venereal disease. Illness began with pain in left inguinal region a week before admission, at which time he noticed a small tender swelling in that region. States that he had never had any lesion on genital organs. On admission, temperature, pulse, and respiration normal. General physical examination negative. In left inguinal region there is an enlarged gland, with considerable periglandular induration; no discoloration of skin, no fluctuant areas; marked tenderness. No evidence of any venereal lesion, or portal of entry; prostatic smears show no organisms. In bed, saline purgative; ichthyol dressing.

April 28, 1923: Continued enlargement of bubo. Temperature up to 102°. Leucocyte count, 9,700; Hb., 80 per cent. Record does not show differential count. Blood serum Noguchi negative.

April 30, 1923: Under ether anesthesia mass of enlarged glands removed; no free pus encountered; wound partly sutured. Glands on section showed multiple purulent foci.

May 15, 1923: Wound has remained clean, but with very slow healing; an enlarged gland at edge of wound removed.

May 26, 1923: Small amount of pus draining.

June 30, 1923: Drainage from wound continues. No sign of healing. Considerable scar tissue around sinuses. Repeated Noguchi reactions negative. Fowler's solution given in increasing doses.

July 27, 1923: Sinus curetted, mass of hard scar tissue removed.

August 10, 1923: Small fluctuant area external to drainage sinus incised, pus evacuated, and drains inserted.

September 1, 1923: Wound of last incision granulating. Sinus at original drainage area persists.

September 11, 1923: Under ether anesthesia large mass of hard scar tissue surrounding sinus excised. Wound partly sutured.

September 13, 1923: Free discharge of pus from wound.

October 14, 1923: Wound healing slowly.

October 24, 1923: To duty. Wound completely healed.

In hospital 190 days.

The glands removed at operation were sent to the Naval Medical School for examination and following report received:

"Sections show a thickened capsule and marked fibrosis throughout the tissue. The germinal centers are well defined and enlarged. The medullary sinuses and blood vessels are distinctly dilated and full of fluid. Numerous areas of leukocytic infiltration are seen, being especially evident in the cortex. In many of the germinal centers small abscess formation has developed. No evidence of tuberculosis nor malignancy."

Case 2.—O. F. F. C-6862. Age, 20. Admitted August 6, 1923. No history of tropical service or any venereal disease. Glands in right inguinal region became tender and slightly enlarged two weeks before admission; bubo has gradually enlarged and pain has increased with enlargement. Patient thinks that he has had some fever. On admission, temperature 101, pulse 90; no record of blood counts: Noguchi negative. Patient appears anemic, but not very ill. General physical examination negative; in right inguinal region there is a large tender mass, with indefinite fluctuation. No sign of any lesion on genitalia, no portal of entry on limbs; prostatic smears show no organisms.

August 8, 1923: Under general anesthesia mass of glands removed and wound partly sutured. Glands were partly necrotic with large purulent areas.

August 14, 1923: Temperature has ranged from 99 to 102 since operation; very little drainage from wound.

Wound healed slowly; patient to duty October 2, 1923, with wound completely healed.

In hospital 57 days.

Pathological report from Naval Medical School: "Sections show the entire gland to be the seat of acute inflammatory reaction associated with vast areas of necrosis and localized abscess formation. No evidence of tuberculosis nor malignancy."

Case 3.—O. F. F. C-7237. Age, 21. Case 2 readmitted to hospital August 7, 1924, with bronchitis, acute. He was found to have a slight general adenopathy, but repeated blood serum Noguchis, after provocative treatment, gave negative results.

August 11, 1924: All chest signs had cleared up, but patient continued to run a temperature up to 102° each day. The lymph nodes in left inguinal region showed slight increase in size. Red blood cells, 4,470,000. Hb., 80 per cent. Leucocytes, 8,800; polymorphonuclears, 63 per cent; large lymphocytes, 12 per cent; small lymphocytes, 20 per cent; mononuclears, 2 per cent; transitional, 1 per cent; eosinophiles, 1 per cent; mast cells, 1 per cent.

August 14, 1924: Leucocyte count, 13,200. Differential count, 64 per cent polymorphonuclears; 35 per cent lymphocytes; 1 per cent eosinophiles. Left inguinal lymph nodes enlarged and tender, with some periglandular induration. X ray of chest shows no demonstrable enlargement of mediastinal glands.

August 18, 1924: Neoarsphenamine, 0.9 grams, given for provocative treatment.

August 20, 1924: Noguchi negative. Inguinal bubo subsiding. Temperature normal.

August 26, 1924: To duty. Left inguinal glands enlarged, but not tender. In hospital 12 days.

Case 4.—R. H. H. C-6990. Age 23. Admitted December 20, 1923. No history of tropical service or venereal disease. States that pain and swelling in right inguinal region began two weeks before admission, following heavy lifting.

General physical examination negative; in right inguinal region there is a mass of enlarged glands, with considerable periglandular induration and edema. There is definite fluctuation, and the skin overlying the mass is adherent and discolored. Blood serum Noguchi negative. No record of blood counts.

Under general anesthesia, glandular mass removed; wound curetted and washed out with ether, then packed with iodoform gauze. The glandular mass contained several necrotic glands, with multiple purulent foci.

Wound healed slowly by granulation, and patient was returned to duty with wound healed January 14, 1924.

In hospital 25 days.

Case 5.—R. M. C. C-7085. Age 18. Admitted March 17, 1924. Native of Florida; has always lived in Southern States; no tropical duty; no history of any venereal disease. States that painful swelling in right inguinal region began one week before admission.

Temperature 101, pulse 90, respiration 20. Patient of slender type, well developed; general examination negative. In right inguinal region are several enlarged glands, hard and discrete, but very tender. Some periglandular induration; no fixation or discoloration of skin. No lesion found on genital organs; no portal of entry on legs or feet; prostate normal, smears show no pus cells or organisms.

Leucocytes, 10,000; polymorphonuclears, 63 per cent; lymphocytes, 35 per cent; red cells, 4,900,000; Hb., 80 per cent. In bed; ichthyol dressing over glands.

March 26, 1924: Blood serum Noguchi negative. No change in condition of glands.

April 10, 1924: Slight softening in central gland, with discoloration of skin. Gland aspirated; cultures made; smears show no organisms; nearly all cells of lymphocyte type, few polymorphonuclears.

April 15, 1924: No growth in cultures. Inguinal region exposed to sunlight 30 to 60 minutes daily.

April 25, 1924: Retroperitoneal glands above Poupart's ligament enlarged and tender. Leucocytes, 10,000; 34 per cent lymphocytes.

May 2, 1924. Small area of fluctuation in inguinal gland aspirated; 10 per cent iodoform in glycerine injected. Smears from pus show no organisms; predominant cell, lymphocyte. Cultures made.

May 5, 1924: Swelling and pain increased; fluctuant area incised under local anesthesia, pus evacuated, and iodoform gauze packing inserted.

May 7, 1924: Cultures made May 2, 1924, show no growth. Wound healing.

May 26, 1924: Wound healed. Slight enlargement of inguinal glands. Retro-peritoneal glands palpable, but not tender. Leucocyte count, 8,600; lymphocytes, 30 per cent; red cells, 4,780,000; Hb., 70 per cent.

May 27, 1924: To duty.

In hospital 99 days.

Case 6.—F. H. C-7131. Age 19. Admitted May 6, 1924, with bronchitis, acute, which cleared up in 10 days. At time of admission there was moderate enlargement of the right inguinal glands, which increased slowly, and caused little discomfort while patient was in bed. No history of tropical service or venereal disease. No evidence of any lesion on genitalia. Blood serum Noguchi negative.

May 14, 1924: Leucocytes, 10,500; polymorphonuclears, 70 per cent; large lymphocytes, 10 per cent; small lymphocytes, 16 per cent; large mononuclears, 2 per cent; transitionals, 2 per cent. Blood serum Noguchi negative.

May 23, 1924: Has had temperature 99 to 101 each day. There is definite fluctuation in right inguinal bubo. Under procaine infiltration anesthesia an incision was made over the mass and several necrotic glands shelled out. Wound packed with iodoform gauze. Glands removed showed multiple purulent foci on section.

June 7, 1924: There has been little drainage from wound, and no sign of healing.

June 16, 1924: Wound granulating. Blood serum Noguchi negative; leucocytes, 9,000; lymphocytes, 27 per cent.

June 27, 1924: Wound healed except for small granulating area. Considerable enlargement of inguinal glands still present. Transferred to medical service for recurrence of bronchitis.

In hospital to date 52 days.

Case 7.—G. B. R. C-7743. Age 22. Admitted June 23, 1925. No history of tropical service or venereal disease. Painful swelling in right inguinal region began three weeks before admission. On admission, temperature 100.8, pulse 92, respiration 22.

General physical examination negative; in right inguinal region there is a large ovoid swelling, with redness and fixation of overlying skin; individual glands can not be defined. Marked tenderness on palpation; indefinite fluctuation in central part of mass.

June 24, 1925: Under local anesthesia, bubo incised, necrotic glands shelled out, and iodoform packing inserted. Glands necrotic, with free pus in scattered foci.

June 30, 1925: Two small glands near first incision enlarged, with fluctuation. Incised and drained.

July 11, 1925: Wounds healing slowly.

July 18, 1925: Pus pockets in lower edge of wound opened and drained.

July 25, 1925: Wound in groin continues draining. Neighboring glands enlarged.

August 5, 1925: Under general anesthesia, incision over inguinal glands extended; necrotic glands and hard scar tissue curetted out. Wound packed with iodoform gauze.

August 23, 1925: Wound healing slowly; scant purulent discharge. Wound healed very slowly; to duty October 18, 1925.

In hospital 113 days.

Case 8.—C. F. D. C-7834. Age 22. Admitted September 11, 1925. No history of tropical service or venereal diseases. Patient states that painful swelling began in right inguinal region about two weeks before admission, and on the left side about one week later. On admission, temperature 101, pulse 78, respiration 20. General physical examination negative. There are bilateral inguinal buboes, larger on right than left. Glands are hard and discrete, with moderate periglandular induration. Moderately tender. No fluctuation. No discoloration or fixation of skin. In bed. Saline purge. Ichthyol dressing.

September 12, 1925: Blood serum Noguchi negative. Leucocyte count, 10,600; polymorphonuclears, 69 per cent; lymphocytes, 29 per cent.

September 18, 1925: Buboes subsiding. Temperature 99 to 100.4. Leucocytes, 10,200; lymphocytes, 30 per cent. Blood Noguchi negative. There was a gradual decrease in buboes. Temperature remained normal after October 11, 1925. Patient sent to duty November 10, 1925, with moderate enlargement of inguinal glands.

In hospital 39 days.

Case 9.—J. G. M. C-7832. Age 25. Admitted September 10, 1925. History of gonococcus infection of urethra in August, 1924; chancroid a month before admission; dark field examinations and blood serum Noguchi tests negative. No history of tropical service. Patient states that swelling appeared in left groin 10 days before admission, and became progressively larger and more painful. This case was admitted to venereal ward and treated as chancroid of lymph node.

September 15, 1925: Necrotic glands removed from left groin.

September 17, 1925: Leucocytes, 11,800; polymorphonuclears, 82 per cent; small lymphocytes, 12 per cent; large lymphocytes, 4 per cent; large mononuclears, 1 per cent; transitionals, 1 per cent.

October 6, 1925: Blood serum Noguchi negative.

October 10, 1925: Blood smears show tertian malaria. Intensive quinine therapy started.

October 31, 1925: Right inguinal glands enlarged and tender. Wound in left groin not healed.

November 2, 1925: Fluctuations in right inguinal glands. Incision and drainage.

November 4, 1925: Noguchi negative. Neoarsphenamine, 0.45 grams.

November 7, 1925: Neoarsphenamine, 0.9 grams.

November 10, 1925: Noguchi negative.

November 14, 1925: Wound in left groin has not healed. Sinus formation with dense scar tissue. Wound in right groin not healed.

November 16, 1925: Under general anesthesia dense scar tissue and necrotic gland remnants removed from left groin.

Mass of glands removed from right inguinal region, which showed multiple necrotic areas.

November 20, 1925: Recrudescence of malaria. Intravenous quinine therapy started. Report on pathological examination of glands excised November 16, 1925: "Chronic inflammation and abscess formation; no evidence of specific or tuberculous infection."

December 8, 1925: Intravenous quinine course completed.

December 11, 1925: Admitted to surgical service. Patient appears anemic and exhausted; has apparently lost weight rapidly; is very weak and toxic.

Temperature 102°, pulse 86; scattered bronchial râles in both lungs. In right groin, a small wound with healthy granulations; in left groin, a large open wound, with edematous granulations, and scant purulent discharge. Extending above the wound there is a large mass of retroperitoneal glands, hard and nodular, with no signs of softening; very tender on pressure.

Leucocyte count, 9,800; polymorphonuclears, 79 per cent; lymphocytes, 20 per cent; transitionals, 1 per cent. Red cells, 4,720,000; Hb., 85 per cent. No malarial organisms found. Blood serum Noguchi negative.

Continued on quinine therapy. Special diet. Daily radiant heat applications over enlarged glands.

December 19, 1925: Retroperitoneal glands are softer, and there is a sinus opening in lower angle of left inguinal wound. A drainage tube was passed through the sinus into the retroperitoneal mass, and a large quantity of thick pus aspirated. This pus under microscope appeared to consist of cell debris and lymphocytes, with few polymorphonuclears and no bacteria. Cultures made.

December 27, 1925: Free drainage of pus continues. Cultures from aspirated pus show no growth. Temperature up to 101° or 102° each day. Leucocytes, 14,600; polymorphonuclears, 71 per cent; lymphocytes, 26 per cent. No malarial organisms found. Drainage tract irrigated daily with Lugol's solution.

January 9, 1926: Septic temperature continues; drainage from retroperitoneal mass slightly decreased. X ray shows drainage tube extending up to level of sacroiliac joint. No apparent involvement of bone. Blood culture shows no growth. Few pus cells and trace of albumen in urine.

January 12, 1926: Operation. Nitrous oxide-oxygen anesthesia, with local procaine infiltration. Incision above crest of ilium, left side; retroperitoneal space entered through Petit's triangle and explored toward sacroiliac joint. Edematous tissue, and enlarged glands found over joint. Opening made into drainage tract leading to groin, and through-and-through drainage established.

January 14, 1926: Daily irrigation with Lugol's solution.

January 27, 1926: Very little drainage from wounds, but no signs of healing. The retroperitoneal mass has decreased to about half previous size. General condition not improved. Temperature 99° to 100°.

January 28, 1926: Antimony-potassium tartrate, 0.05 gram intravenously. Temperature reaction 102°.

January 29, 1926: Profuse drainage from wound.

January 30, 1926: Edges of wounds show granulations.

February 1, 1926: Antimony-potassium tartrate, 0.08 gram intravenously.

February 5, 1926: Antimony-potassium tartrate, 0.1 gram intravenously. Wound in flank healing; irrigation no longer passes through to groin. Tartar emetic, 0.1 gram intravenously at four day intervals. Repeated blood serum Noguchi and Kahn tests negative.

February 15, 1926: Wounds healing rapidly. General condition much improved; gaining weight.

March 6, 1926: Wounds healed. There is some hard edema in left groin for which radiant heat applications are given.

March 12, 1926: Patient out of bed. Has gained 20 pounds since tartar emetic was started. Last injection of tartar emetic this date.

April 1, 1926: Has very slight edema in left groin. Leucocytes, 7,800; polymorphonuclears, 69 per cent; small lymphocytes, 27 per cent; large lymphocytes, 4 per cent. Red cells, 4,440,000; Hb., 85 per cent.

Continued under observation as convalescent. Total antimony-potassium tartrate, 1.23 grams.

April 15, 1926: To duty.

In hospital 227 days.

Case 10.—R. B. T. C-7995. Age 29. Admitted February 2, 1926. No history of tropical service or venereal diseases. Patient states that painful swelling of inguinal glands began one week before admission; denies any lesions on genitalia; states that last intercourse was in France, six weeks prior to onset of swelling.

Pain started in both inguinal glands, a week ago, at which time a moderate bilateral swelling was discovered; discomfort has increased with enlargement of buboes.

General physical examination negative. There are enlarged glands in both inguinal regions, forming oval masses about 3 by 7 centimeters. The glands are matted together, but individual glands can be palpated; no adherence to skin or deep fascia. No scars or signs of any lesion on genital organs, no urethral discharge; prostatic fluid shows no organisms; no open lesions on lower limbs, nor apparent portal of entry for infection. Temperature 99. Pulse 80. Leucocytes, 9,800; polymorphonuclears, 69 per cent; small lymphocytes, 23 per cent; large lymphocytes, 4 per cent; transitionals, 2 per cent; eosinophiles, 2 per cent. Urine shows no abnormal elements. Patient kept in bed, saline purge, light diet.

February 5, 1926: Left bubo shows no change; on right side there are two definite areas of fluctuation, with adherence to skin and deep fascia, and considerable enlargement of the glandular mass.

February 6, 1926: Under nitrous oxide-oxygen anesthesia right glandular mass with adherent skin excised. Wound left open, and packed with iodoform gauze. (On section of excised mass, a small amount of pus was found in central part. There was marked periglandular inflammation. Smears from pus showed no organisms. Cultures of pus showed no growth in four days. Microscopic examination of sections showed marked proliferation of germinal centers in peripheral parts of glands, with multiple necrotic foci in central parts; marked periglandular inflammation with round cell infiltration.) Antimony-potassium tartrate 0.05 gram intravenously.

February 7, 1926: Left bubo is softer with small fluctuant area.

February 8, 1926: Noguchi and Kahn tests on blood serum negative. Leucocytes, 7,700; polymorphonuclears, 64 per cent; small lymphocytes, 28 per cent; large lymphocytes, 5 per cent; transitionals, 2 per cent; eosinophiles, 1 per cent.

February 9, 1926: Antimony-potassium tartrate, 0.08 gram intravenously. Right inguinal wound shows beginning granulation; left bubo very soft, fluctuant; no discoloration of skin.

February 10, 1926: Left bubo aspirated. Smears and cultures made of pus, smears show no organisms; pus almost entirely lymphocytes.

February 14, 1926: Cultures show no growth. Left bubo decreasing rapidly in size; operative wound granulating. Antimony-potassium tartrate, 0.1 gram intravenously, repeated at four-day intervals.

February 17, 1926: Noguchi and Kahn tests negative.

March 8, 1926: Small fluctuant area on left side opened, watery fluid evacuated, no pus found.

March 16, 26: Wounds almost healed. Last injection of tartar emetic; total 1.03 grams in 11 injections.

April 1, 1926: Wounds completely healed. Leucocyte count, 7,200; polymorphonuclears, 60 per cent; small lymphocytes, 20 per cent; large lymphocytes, 9 per cent; transitionals, 2 per cent; eosinophiles, 1 per cent; basophiles, 1 per cent; red-blood cells, 4,100,000; Hb., 80 per cent. Continued under observation as convalescent.

April 18, 1926: Recrudescence of left bubo.

April 19, 1926: Second course of tartar emetic, intravenously, started.

April 30, 1926: Bubo has subsided.

May 1, 1926: Last tartar emetic; total for second course, 3.3 grams in four injections.

May 4, 1926: Ready for duty.

In hospital 90 days.

Case 11.—W. L. P. C-8007. Age 20 years. Admitted February 9, 1926. No history of tropical service; denies all venereal diseases. Patient states that pain in left inguinal region started a week before admission, at which time he noticed a swelling of the glands. Pain increased with enlargement of bubo.

General physical examination negative; there is enlargement of the left inguinal glands, forming an oval mass about 2 by 5 centimeters. No apparent softening, glands matted together, not adherent to skin. There is a small, nonindurated scar in the coronal sulcus of the glans penis; scar resembles that of a recent herpetic lesion. Temperature 99, pulse 76. Leucocytes, 8,300; polymorphonuclears, 58 per cent; small lymphocytes, 33 per cent; large lymphocytes, 6 per cent; transitionals, 2 per cent; eosinophiles, 1 per cent.

February 16, 1926: After one week in bed the bubo is somewhat larger, with softening and definite fluctuation. Temperature has varied from normal to 100°. Blood serum Noguchi and Kahn tests negative.

February 17, 1926: Antimony-potassium tartrate, 0.05 gram intravenously.

February 20, 1926: Antimony-potassium tartrate, 0.08 gram intravenously. Bubo has decreased to about one-fourth original size; soft and fluctuant.

February 24, 1926: Antimony-potassium tartrate, 0.1 gram. Bubo practically well. Same amount of tartar emetic, intravenously, on February 28, 1926, and March 4, 1926.

March 6, 1926: Bubo has decreased to a small hard nodule, which is not tender or painful. No further treatment.

Total antimony-potassium tartrate, 0.43 gram.

March 13, 1926: To duty, well.

In hospital 42 days.

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IDEAS ON RECRUITING

By J. G. SMITH, Lieutenant, Medical Corps, United States Navy

The Salt Lake City recruiting district is comprised of the States of Utah, Montana, and the greater parts of the States of Idaho and Wyoming. The recruiting station is located in Salt Lake City, Utah, with substations in several of the larger towns of the several States composing the district. Distances separating towns and communities in this intermountain territory are very great, and it is impossible to reach a very large percentage of prospects by direct contact with recruiters. In fact, a goodly percentage of our applicants travel from 600 to 1,000 miles before being seen by the Navy recruiter or examined by the naval medical officer.

Mailing lists are secured from postmasters, city, school, and church registers. The Mormon Church in particular keeps accurate records of all births and deaths. Also of the addresses of its members. Some cities register all youths below 21 years of age, with street addresses.

It has been the policy at this station to furnish transportation to Salt Lake City to all applicants who furnish evidence of having satisfactorily passed a physical examination by a reputable physician, this examination being at their own expense. Return transportation is furnished in case they do not measure up physically to Navy standards as determined by the naval medical officer at Salt Lake City.

It was found, however, that the percentage of rejections for physical defects among applicants having received preliminary examinations by civilian physicians was almost as high as the percentage of rejections of applicants who had not received the preliminary examinations. To remedy this a mimeographed examination blank was mailed to applicants to be filled out by the examining physician. This form was originated, I believe, by Chief Pharmacist's Mate T. H. Clark, United States Navy, at a time when for some reason there was no medical officer at this station. It was in use when I reported here for duty and, while a step in the right direction, fell far short of expectations. Rejections at Salt Lake City continued high in spite of preliminary examinations. Expenses

involved made it imperative that this be remedied or the policy of furnishing transportation be abandoned.

With the "Manual for the Medical Department" as a guide I worked out a "preliminary physical examination blank," which with the exception of a few minor changes we are still using with entire satisfaction.

This form, which calls attention to the physical requirements and the causes for rejection, is mailed to prospects along with application blanks, reference papers, etc. On receipt at the recruiting station it is referred to the medical officer for his O. K. or rejection. In a certain percentage of cases it is necessary to ask for more detailed information. However, since the adoption of this form rejections at this office of men sent in from outlying districts have been few.

Before being ordered to duty at substations all recruiters spend sufficient time in the examining room to enable them to recognize outstanding defects that are cause for rejection, such as defective vision, defective hearing, defective or insufficient number of teeth, poor occlusion, gross disease of gums, poor physique, vermin, marked skin disease, missing or overlapped fingers or toes, obscene tattooing, disfiguring blemishes, deformities, etc. Thus they are able to eliminate the obviously unfit, saving these men the expense of a physical examination.

CLINICAL NOTES

ONE THOUSAND OPERATIONS DURING A SHORE CRUISE¹

By G. F. COTTLE, Commander, Medical Corps, United States Navy

It is difficult for our civilian colleagues to visualize correctly the life of a naval surgeon, for they must see the Navy from the beach or during a few hours spent by them in a brief visit to a naval ship. If more frequently they see in the movies a group of battleships majestically moving along in battle formation or see a submarine or destroyer passing under the Brooklyn Bridge, this gives them no true picture of the lives of the men on board these ships. If they think of the naval surgeon at all, it is apt to be with the picture in mind of the last ship's doctor they met on an ocean liner. It is, of course, true that a naval surgeon is at times a ship's doctor, but his patients have not only the few and simple conditions met with during the few days that a passenger ship is at sea. On his ship live a group of men for whose health he is alone responsible. He must be interested in sanitation and hygiene, in general and tropical medicine, in emergency surgery, and in industrial surgery and medicine. The 1,200 men aboard his ship are, medically, completely his. His work is valued not by the size of his sick list but by the number of men he keeps always on the job. Seldom can he call upon a colleague to take a case off his hands. He is expected to meet all emergencies. As his ship moves from port to port and from country to country all over the world there come to him problems in quarantinable and contagious diseases, problems in tropical medicine.

The ship is a great floating industrial plant with its men engaged in 50 or more occupations, exposed to all the hazards of the mechanical arts as well as to the hazards peculiar to the Navy and to the sea. When at sea, away from the shore hospital and the hospital ship, he must be prepared to meet all the emergencies of medicine and surgery in which immediate expert attention is the requisite of success. The acute appendix, the ruptured ulcer, the fractured femur, the acute mastoid, the case of diphtheria, of cerebrospinal meningitis, of malignant malaria, the acute iritis, the fractured spine, the Neisserian ophthalmia, all come to him, not in large

¹ Read before the Brooklyn Surgical Society, Dec. 3, 1925.

numbers but often all in the course of a single year. He is equipped for the care of these cases which in civil life are apt to go, not to any one doctor but to several different doctors, each a specialist in a particular branch of medicine. Being equipped, having the problem presented, he has learned from all the specialties his own specialty and has the ability to meet these emergencies single-handed.

The naval surgeon spends about half of his life at sea with the men on the ships of the Fleet, or at some naval station in the Tropics where he attends not only to the medical needs of the Navy but also to the medical needs of large and small native island populations. The other half of his life more nearly approximates the work of his civilian brother, for it is spent in the dispensaries and naval hospitals which are a part of the shore bases of the Fleet in the United States. Since the World War the amount and variety of medical and surgical work in our naval hospitals has been increased because the Navy is doing its share in the Government's problem—the care of the veteran. By a recent law all veterans are entitled to treatment in a Government hospital for any disease or injury requiring hospitalization whether the condition be of service origin or not.

The naval hospital, Brooklyn, N. Y., receives from the Veterans' Bureau patients drawn from the thousands of veterans resident in New Jersey, New York, and Connecticut. During the year, April 1, 1923, to April 1, 1924, the number of operations, exclusive of eye, ear, nose, and throat, performed by the surgical section of that hospital was 1,000. A brief review of these operations, of the surgical principles followed, and something of the results obtained may serve to illustrate the work which the naval surgeon is expected to do when assigned ashore to a naval hospital. These operations may be classified as follows:

Region of operation	Number	Deaths
Abdominal.....	252	6
Hernia.....	217	.....
Anal.....	176	.....
Thoracic.....	17	.....
Head and neck.....	27	1
Urological.....	59	1
Blood vessel.....	74	.....
Extremities.....	126	2
Miscellaneous.....	52	.....
Total.....	1,000	10

Of the 252 abdominal operations, by far the largest number, 219, were for appendicitis, acute and chronic. Six were for gall-bladder disease, 4 for gastric and 12 for duodenal ulcer, 2 for pylorospasm,

1 for tumor of the stomach, 4 for cancer of stomach or intestines, 1 for rupture of the liver, and three for peritoneal adhesions. The attitude of this hospital toward its cases of gastric and duodenal ulcer was detailed in a paper read before this society at its meeting here last year.² The six gall-bladder operations were for stone. Five had stones and one had a deformed and thickened gall bladder from a former drainage operation. Three of these cases were acute, with fibrin, pus, and a gangrenous condition of the mucosa; three were chronic in symptomatology and findings. In one, a cholecystostomy was done; in the remainder, cholecystectomies were performed. Many patients come to this hospital with the vague symptom complex which is so frequently diagnosed chronic cholecystitis by many capable groups of internists and surgeons. Few gall bladders have been removed here from this large group of clinically suspicious cases. The attitude of the surgical service here during the two-year period reviewed has been, perhaps, ultraconservative. The rule has been followed that, to warrant removal, a given gall bladder must be obviously pathological in its gross appearance at operation. Thin-walled, normal appearing gall bladders have not been taken out because there was a history clinically suspicious of chronic cholecystitis. Perhaps some of our patients clinically suspected of harboring diseased gall bladders may have left us without cholecystectomy, only to go elsewhere and have their gall bladders removed. So ill-defined, however, is the exact diagnostic symptom complex of chronic cholecystitis and so slight the demonstrable pathology seen in many gall bladders removed at operation elsewhere that we have preferred to err on the side of conservatism in this type of surgery.

The five cases in which cholecystectomy was done were closed without drainage, except one case which was drained because the operative field was not entirely dry at the time for closure. The 219 cases of appendicitis included a few cases of spreading and generalized peritonitis, but the large majority were early acute or interval cases. In all but 26 the McBurney incision was used. Many of these cases were done under local infiltration anesthesia; a considerable number were begun with local and completed under ether; a very few were done under ether from the start. Drainage was used very seldom in the acute cases and, of course, not at all in the interval group. One incisional hernia occurred after a McBurney incision which had been drained. In this group of 252 abdominal operations there were six deaths; four of these six were cancer cases. These were advanced cases in which radical surgery was tried as a forlorn hope. The other two deaths were in the appendix group;

² *Annals of Surgery*, January, 1925.

one, a 10-day-old general peritonitis in which operation failed to bring about a cure. The other death was in the interval appendix group. This last death was one of the tragedies which always threaten in any surgical procedure, and against which all the art of surgical technique is used—a death from peritonitis in a clean appendix, an infection in a clean case, the only infection in the entire series of 1,000 cases and during a period of two years.

Of the 217 hernia operations 181 were for inguinal and 4 for femoral hernia; 28 were for recurrent inguinal hernia, and 4 for postoperative incisional hernia. All hernia operations were performed under local procaine, infiltration anesthesia. It was the firm belief of this surgical group that ether anesthesia is definitely contraindicated in hernia repair. With ether, vomiting and retching are the rule, and postoperative coughing is more severe and prolonged. The sutured tissues subjected to these strains from ether are at a disadvantage. Bassini repair was the method of choice, though special anatomical conditions sometimes led to the use of modifications, and, in a few instances, to the use of other types of operation. Recently a six-years' study or follow-up of all hernia operations was begun at this hospital, and this study is still in progress. As yet no recurrences from the group here reported have come to light, but sufficient time has not yet elapsed to determine whether the methods followed have brought results to the patients on a par with results usually expected to follow this operation. In the indirect type of inguinal hernia, high ligation, and turning upward of the ligated neck of the sac, was considered an essential step. In the direct hernias the defect in the transversalis fascia, which is so often demonstrable by the finger of the surgeon, was always carefully closed with an extra layer suture. In this group the complications were one postoperative phlebitis and two postoperative pneumonias. These complications were not of serious consequence to the patients, though, of course, the phlebitis case had to have a longer convalescent period than the usual one month.

The 76 anal operations were for the common conditions, hemorrhoids and anal fistulæ. The hemorrhoids were removed by ligation and excision, not by cautery. The fistulæ were incised and then completely excised, the area of excision being packed with gauze until healing was complete. Local, four-point, procaine, infiltration anesthesia and caudal block anesthesia were frequently used instead of ether.

The thoracic operations, 17 in number, were all thoracotomies; 13 primary for empyema, 3 secondary for chronic fistulæ of the chest wall following earlier operations for empyema. Thirteen of the empyemas were postpneumonic; 3, tuberculous pyopneumothorax.

The other chest operation was a removal of ribs and costal cartilages for an extensive osteomyelitis of unknown etiology. All of these operations were performed under local anesthesia, including the chronic secondary operations which involved the removal of large portions of four or five ribs and rather extensive débridement of scar tissue and thickened pleura. Drainage in the empyema operations was by means of a large-caliber soft-rubber tube with a flange inside the pleural cavity.

The tube led over the side of the bed into a large bottle half full of fluid. When the patient coughed the pus ran into the bottle, the fluid prevented a return of air, and this tended to reproduce in the pleura the normal negative pressure of the closed chest cavity. This type of drainage, which takes the pus away from the patient, lessens the discomfort of frequent changes of dressings and of being bound up in pus-soaked gauze.

Among the 27 head and neck operations were 5 thyroidectomies, 14 excisions of tuberculous lymph nodes of the neck, 1 elevation of depressed fracture of the vault of the skull, 1 tracheotomy for laryngeal stenosis, and 1 incision for angina ludovici. The one death in this group was that of the patient with Ludwig's angina. Of the thyroidectomies, 1 was for simple adenoma and 4 were in toxic exophthalmic cases with damaged hearts. All were given Lugol's solution and rest in bed as part of the preparation for operation, and all but one were done under local anesthesia. The patient with simple adenoma and one of the exophthalmic cases were returned to duty in the Navy; two other exophthalmic cases returned to their work in civil life greatly benefited. The fifth patient on whom thyroidectomy was performed died three months after operation, in another hospital, of uremia, due to his damaged heart and kidneys.

The 59 urological operations were all referred for general surgery by a competent urologist of the staff of this hospital and were operated upon only after thorough study, including, in the kidney cases, complete cystoscopy, pyelography, and kidney function tests. There were 11 nephrectomies: 3 for unilateral renal tuberculosis, 8 for infected hydronephrosis. Of the 7 cases of kidney stone, 4 required attack upon the kidney pelvis, 1 upon the ureter above the pelvic brim, 2 upon the ureter below the pelvic brim. There was one suprapubic cystotomy for large multiple stones in the bladder. Most gratifying results were obtained in the six cases of tuberculosis of the seminal tract. All had fistulæ in the scrotum and nodular conditions of the vas. The seminal vesicles were not removed, after the method advocated by Young. The procedure consisted of opening the inguinal canal, pulling the vas out as far as possible through the internal ring and severing it high up, so that over one-half of

its length was removed. Then, following closure of this upper wound, the infected sinus of the scrotum, with the epididymis, was removed through the lower incision. All these patients gained weight immediately and returned to their sanatorium treatment with a greatly improved chance to win out in their fight against pulmonary tuberculosis. All of the hydronephrosis cases returned to work much improved after the removal of the damaged kidney. Three nephrectomies were done for tuberculosis of the kidney, one patient dying of shock and hemorrhage. The kidney in this case was so densely bound to its bed, to the diaphragm, and to the overlying viscera that, in lifting it from its bed, too great damage was inflicted upon the patient.

The 76 operations of the blood-vessel group were as follows: 47 for varicose veins, 26 direct blood transfusions, and 1 for ruptured aneurism of the femoral artery in Hunter's canal. The results in the varix cases were good. Most of these patients were returned to work apparently cured. However, not every case of varix that came to the hospital for operation was operated upon. A great many were refused operation by this staff. Two questions were taken into consideration in arriving at a decision to operate. First, Does the condition actually interfere with the patient's ability to make a living? Second, Does pressure on or near the proximal end of the long or short saphenous vein prevent rapid refilling of the previously emptied varicose veins? It was found that when these two questions were answered in the affirmative a happy ending to operative interference was the rule. The operation of choice on the long saphenous was done through three incisions and included a stripping of the main vessel with a Mayo stripper between the two upper incisions placed in the thigh and a complete severance through the third incision of all the varicosed branches in the calf.

The direct blood transfusions were given for several different conditions, mostly upon recommendation of the medical service. Professional donors and the Miller type of apparatus were used. The Lindeman needle was found to be easier for some of the staff to use than the large, blunt Miller needle. This operation, though technically difficult, is one with which all naval surgeons should be familiar. The major difficulty found in this hospital in teaching its technique to various members of the staff has been in getting the beginner properly to enter the vein. If this step of the technique is mastered thoroughly, the procedure ceases to be one that should be turned over to a specialist. The tendency of general surgeons to turn this operation over to one especially trained in its difficulties must be combatted in the Navy, because aboard ship, when an emergency arises that requires transfusion, the naval surgeon must meet it, for he is the only doctor there.

Among the 126 operations upon the extremities are included amputations, open operations upon long bones, removal of foreign bodies, old war osteomyelitis cases, and reconstruction surgery. The majority of cases in this group were among veterans, and were mainly operations to correct deformity or aid in the restoration of disabled veterans to a vocational status. Two of these cases died—one had a compound fracture of both bones of both legs, and died of septicemia a few days after the compound fractures were cleansed and reduced; the other was a senile tabetic, operated upon for an unreduced simple fracture of the anatomical neck of the humerus, who died of uremia.

If this summary of the surgical work at the United States Naval Hospital, New York—1,000 consecutive operations with 10 deaths—has given a picture of one sector of the naval surgeon's work ashore; if it has given the Brooklyn Surgical Society an idea of what the naval surgeon is trying to do, and something of the results obtained, it will have accomplished the purpose for which it was prepared.

FILARIASIS

REPORT ON 1,742 PERSONS OBSERVED IN ST. CROIX, VIRGIN ISLANDS

By H. V. HUGHENS, Lieutenant commander, Medical Corps, United States Navy

When one arrives in a locality for the first time he is impressed most by the unusual. In the Tropics the medical man will probably be most impressed by any unusual physical condition of the people. Upon arrival in the Virgin Islands the most impressive thing noticed in regard to the physical condition of the people is the large number having elephantiasis. It follows that the cause of this condition and how to deal with it is next to occupy the mind. The foregoing was no doubt experienced by the contingent of medical officers, under the command of Surgeon Butler, sent to the Virgin Islands after the purchase of these islands by the United States in 1917. In the organization of the medical service for these islands the officers included a definite form for taking medical histories. In St. Croix the order was given in 1919 that in the routine examination of patients admitted to the hospital would be included the examination of the blood for the embryo of *Filaria bancrofti*. The blood smear was taken at midnight following the admission of the patient and examined the next morning for the filarial embryo. The results were recorded on the laboratory sheet of the medical record of the patient. This system meant the recording of various data which are a permanent record and available for research when an interested person can find the time to take up this kind of work.

Among the various interesting conditions was the preponderous number of persons having manifestations of filarial infection and the relative high percentage of patients showing the filarial embryo in their blood. The writer was stimulated by these facts and began to collect data on the incidence of filariasis and the manifestations of the disease in St. Croix.

Others were interested and gave their hearty cooperation. Chief Pharmacist (T.) H. Rydeen contributed a nice bit of information, further confirming MacKinzie's observations. He had the occasion to take a blood smear on a man who worked at night and slept in the daytime. In this smear he found numerous filarial embryo. He then took smears from a number of men who worked at night and slept in the daytime and found a good percentage of positives in those from whom the blood smears were taken at the middle of their sleeping period.

St. Croix is an island of 85 square miles and having a population of approximately 12,000, consisting principally of people of various amounts of African blood. There are two towns, 15 miles apart, and approximately 60 plantations, with their villages for the accommodation of the laborers. Christiansted, near the east end of the island, has a population of approximately 3,000. The Municipal Hospital here draws its patients from as far west as King's Hill, the central point between the two towns. This end of the island has somewhat less rainfall than the west end. There are more wells from which water is used, and there are many cisterns and rain barrels for the collection of drinking water. This end of the island is more hilly, and it was found by a mosquito survey that fewer breeding places existed than on the west end. The incidence of positive smears in those showing clinical manifestations was 12.5 per cent, while the Frederiksted group showed 23.8 per cent.

Frederiksted, having a population slightly less than that of Christiansted, is 15 miles west of the latter town. There is considerable flat and marshy land around the west end. Both towns are located on the ocean. Immediately after the arrival of our medical officers a campaign was inaugurated for the purpose of mosquito eradication. Finally, all cisterns and barrels were screened, but there continued to be millions of the *Aedes variegatus*. There was no way to control the breeding of mosquitoes in the tropical growth, sugar cane, swamp, and palm trees.

Due to the many duties required of the writer, complete data could not be collected concerning filariasis, but the following of more than passing interest was assembled.

These data are based on 1,257 admissions to the Christiansted Municipal Hospital and 506 to the Frederiksted Municipal Hos-

pital, St. Croix, Virgin Islands. The cases were taken from the medical history files and included every patient admitted from April, 1919, to February, 1920, who had a blood examination for the filarial embryo. It was routine to have a filarial examination done, but occasionally the routine was not carried out. The data as to sex are complete in the Frederiksted group, but in the Christiansted group only those showing clinical manifestations were considered.

The remaining data are based on a total of 1,742 persons observed.

Sex.—In the Frederiksted group of 505 persons, 260 were male and 245 female. There were 14 cases of elephantiasis in the males and 11 in females, and there were 34 instances of hydrocele. There were 161 patients who gave one or more positive filarial smears, 82, or 50.9 per cent of whom were males and 79, or 49.1 per cent, females. (Table I.) In the Christiansted group of 1,257 patients the differentiation was not made except in those showing clinical manifestations. One hundred and forty-two persons showed clinical manifestations, 110 males and 32 females. There were 76 males having hydroceles. This number taken from the male total of 110 leaves 34 showing other clinical manifestations. It will be observed that by leaving the hydroceles out of consideration the incidence as to sex was approximately the same. (Table II.)

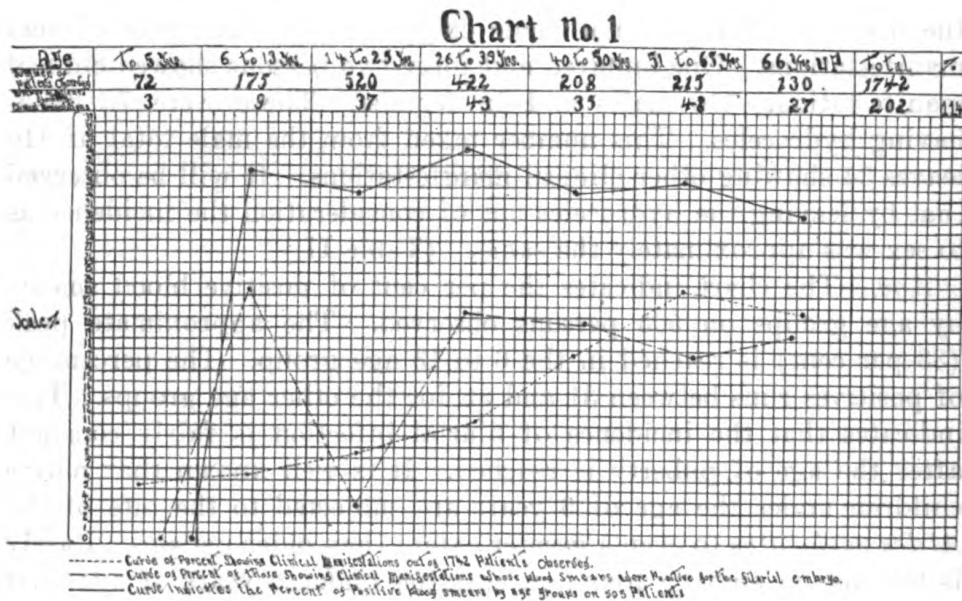
Age.—The chart indicates the per cent of positive blood smears by age groups on 505 persons observed. The approximate peak (33 per cent) is reached in the 6 to 13 age group. The percentage of positives runs between 31 and 36 for the other age groups. This indicates that the incidence of filarial infection is fairly constant after the age of puberty is reached. It is well known that native children under the age of 6 years are subjected to the bite of the *Aedes variegatus* to even a greater extent than older persons. Rarely is the filarial embryo found in children under 6 years of age. Of 72 observed in this group there was not an instance in which the filarial embryo was found, but there were two who showed enlarged femoral lymph nodes and one had a hydrocele. These 72 children had not been breast fed. This fact rules out maternal protection by breast feeding. From this observation it is suggested that repeated infection over a long period of time is necessary before the filarial embryos become numerous enough to be found in a blood smear taken from the peripheral circulation.

Lieut. Commander H. M. Stenhouse, Medical Corps, United States Navy, suggested to the writer that, since, as shown by this investigation, the peak of infection is approximately reached about the age of puberty, the lowered resistance of the individual at this time may account for the maximum infection being reached at this age. The curve indicating the clinical manifestations by age groups is a grad-

ual ascending one until the peak is reached in the 51 to 65 age group. The clinical manifestations of filariasis become more frequent and more marked as the infected individual grows older.

Race.—In this series there were no white persons included. In those showing clinical manifestations the negro blood predominated. There are a few persons of pure white blood on the island who have clinical manifestations of filariasis, but they live under the same conditions as those commonly infected.

Clinical manifestations.—In series 1 (Table I) 59 patients, or 11.6 per cent of the number observed (505), showed clinical manifestations. Table I shows the incidence of elephantiasis of scrotum, legs, labia, and face, and of hydrocele. There were 34 hydroceles and 25 instances of elephantiasis in the series.



Due to the failure of the medical histories to show enlargements of the femoral glands, that symptom is left out of the series. Other glandular enlargements, such as inguinal, cervical, and epitrochlear, were frequently mentioned but, due to the prevalence of venereal infection, these are not considered in this series.

In series 2 (Table II) 143 patients showed clinical manifestations, or 11.3 per cent of 1,257, the number observed. Table II shows the incidence of elephantiasis of scrotum, legs, labia, arm, and femoral lymph nodes, and hydroceles, unilateral and bilateral. There were a total of 76 hydroceles, 44 of which were unilateral and 32 bilateral, and 76 instances of elephantiasis or enlargement of the femoral lymph nodes. It will be noted that there were nine instances of persons having more than one of the charted symptoms.

Due to the common occurrence of early or acute filarial manifestations, none were recorded as being seen in this stage. A few cases were seen by the writer but are not included in this series.

It will be noted that 110 of the 202 persons showing clinical manifestations had hydrocele. This high percentage of hydrocele incidence can not be construed as meaning that hydrocele is prevalent in this proportion in the populace of the island. Persons suffering from hydrocele are inconvenienced by the affection and are more inclined to report for treatment than those having other filarial manifestations.

TABLE I.—Series I

Age	Blood smears on 505 patients						Total number showing clinical symptoms							
	Number of patients observed	Male			Female			Group total	Group per cent	Male		Female		Positive blood smears
		Positive	Negative	Per cent positive	Positive	Negative	Per cent positive			Number	Per cent	Number	Per cent	
Blood smears:														
To five years.....	12	0	7	0	0	5	0	0	0	0	0	0	0	0
6 to 13 years.....	30	5	8	38.4	5	12	29.4	1	3.3	0	0	1	100	1
14 to 25 years.....	153	16	34	32	32	71	31	11	7.1	11	100	0	0	1
26 to 39 years.....	132	23	40	36.5	24	45	34.7	19	14.3	15	78.9	4	21.1	4
40 to 50 years.....	72	16	29	35.5	7	20	26	8	12.5	8	100	0	0	3
51 to 65 years.....	62	13	29	32.6	7	13	35	11	12.7	7	63.6	4	36.4	4
66 up.....	44	9	17	34.6	4	14	22.2	9	20.4	7	77.7	2	22.3	1
Total.....	505	82	164	33.3	79	180	30.5	59	11.6	48	81.3	11	18.7	14

Age	Incidence of elephantiasis														Hydrocele
	Male							Female							
	Scro-tum	Legs						Legs						Labia	Face
		Right		Left		Both	Right		Left		Both				
		Positive	Negative	Positive	Negative		Positive	Negative	Positive	Negative		Positive	Negative		
Blood smears:															
To five years.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 to 13 years.....	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
14 to 25 years.....	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
26 to 39 years.....	0	2	0	0	0	0	1	1	0	0	4	0	0	0	3
40 to 50 years.....	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
51 to 65 years.....	0	0	0	1	0	0	0	2	0	1	0	0	1	1	2
66 up.....	0	1	1	0	0	1	0	1	0	0	0	0	1	0	3
Total.....	0	4	1	1	0	2	1	5	0	1	0	4	1	2	25

TABLE II.—Series II

Age	Number of patients observed	Total number showing clinical symptoms						Incidence of elephantiasis											
		Group total	Group, per cent	Male		Female		Positive blood smears (Per cent)	Male										
				Number	Per cent	Number	Per cent		Scro- tum	Legs						Femoral lymph node			
										Right	Left	Both							
													Positive	Negative	Positive		Negative	Positive	Negative	Positive	Negative
Blood smear:																			
To 5 years.....	60	3	5.0	1	33.3	2	67.7	0	0	0	0	0	0	0	0	0	0	0	0
6 to 13 years.....	145	8	5.5	5	62.5	3	42.5	12.5	0	0	0	0	0	0	0	0	1	1	3
14 to 25 years.....	367	26	7.0	23	88.4	3	11.6	0	0	0	0	1	0	0	0	0	0	0	7
26 to 39 years.....	290	24	8.2	22	91.6	2	8.4	16.6	0	0	0	0	0	1	0	0	0	2	4
40 to 50 years.....	136	27	19.8	22	81.1	5	18.9	11.0	0	0	0	0	0	1	0	0	1	1	1
51 to 65 years.....	153	37	24.1	26	70.2	11	29.8	5.4	0	0	0	1	0	1	0	2	1	8	8
66 years up.....	86	18	20.9	11	61.1	7	38.9	11.1	0	0	1	0	0	0	0	1	1	3	3
Total.....	1,237	143	10.4	110	76.9	33	23.1	12.5	0	0	1	2	0	3	0	4	6	26	26

Age	Incidence of elephantiasis										Hydrocele				
	Female														
	Legs						Labia	Arm	Femoral lymph node	Unilat- eral	Bilateral				
	Right		Left		Both										
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	
Blood smear:															
To 5 years.....	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0
6 to 13 years.....	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
14 to 25 years.....	0	0	0	2	0	0	0	1	0	0	0	0	12	0	3
26 to 39 years.....	0	0	0	0	0	1	0	0	0	0	1	3	6	0	6
40 to 50 years.....	0	0	0	0	0	1	0	0	0	0	4	2	11	1	6
51 to 65 years.....	0	2	0	2	0	4	0	0	0	1	3	1	4	2	13
66 years up.....	0	1	1	0	0	1	0	0	0	0	4	1	3	0	1
Total.....	0	3	1	4	0	7	0	1	0	1	17	7	37	3	29

SUMMARY AND CONCLUSIONS

This survey indicates that the incidence of filarial infection and the clinical manifestations of filariasis appear to depend upon the prevalence of *Aedes variegatus* and the repeated inoculation of persons, over a long period, by the infected mosquitoes.

The lowered resistance of persons about the age of puberty seems to be a contributing factor toward the appearance of the filarial embryo in the peripheral circulation.

The drop on the chart from 22.5 per cent in the 6 to 13 age group to 2.5 per cent in the 14 to 25 age group, and the subsequent rise to 20.8 per cent in the 26 to 39 age group possibly indicates the blocking of the lymphatics by adult filaria and subsequent reinfection.

BISMUTO-YATREN A AND B IN THE TREATMENT OF YAWS¹

By R. P. PARSONS, Lieutenant Commander, Medical Corps, United States Navy

In March, 1926, a study was begun of the value of two new bismuth drugs in the treatment of yaws. These drugs bear the trade names of Bismuto-Yatren A and Bismuto-Yatren B. The "A" drug is an aqueous solution of the sodium salt of bismuthyl iodo oxyquinolin sulphonic acid, containing an equivalent of 10 milligrams of metallic bismuth per cubic centimeter of solution. It may be used either intravenously or intramuscularly. The "B" drug differs only in being in quinine combination and being in an oil suspension containing an equivalent of 36 milligrams of metallic bismuth per cubic centimeter of the suspension. This drug is used only intramuscularly. The manufacturers recommended that these drugs be given in combination on the same day—that is, the "A" drug intravenously and the "B" intramuscularly, administration being at from two to seven-day intervals and in dosage for adults of 3 c. c. for the "A" and 2 c. c. for the "B." For various reasons it was preferred here not to use the two in such a combination, and no patient receiving one of the drugs ever received the other. Intervals of injection were never less than seven days and dosage was for the "A" from 1 to 3 c. c., intravenously, according to weight of patient, and, for the "B," from 1 to 2 c. c. No patient receiving these drugs had previously received arsenicals or other bismuth drugs.

Forty cases were treated, twenty receiving the "A" and twenty the "B" drug. Except for two cases of secondary lesions and four of primary lesions in the group receiving the "A" drug, all of the cases had ulcers. Ulcer cases were selected because they could be hospitalized, thus facilitating observation, and because the rate of healing could be measured so much more accurately than in the case of other lesions. As these ulcers are practically always circular or oval their diameters were measured weekly in inches, and the rate of healing was thus tabulated easily and accurately.

It has been our experience here that yaws ulcers heal more slowly than other yaws lesions do, and therefore they make excellent mate-

¹ From L'Hospice St. Michel, Jacmel, Haiti. Public Health Service of Haiti.

rial with which to test a spirocheticide, and it may reasonably be supposed that any drug which heals them will act even more promptly upon the other lesions.

The ulcers among these cases varied in duration from three months to five years, and in size from 1 inch in diameter to 9 by 9 inches in dimension.

Since the "A" drug possesses the advantage of availability for intravenous use, most of the cases received it intravenously, in order to determine whether this method of immediate absorption would result in any general toxic symptoms. More than a hundred such injections were given, and in no case were there observed either general symptoms or local vein changes. Medical officers² at the Haitian General Hospital, Port au Prince, have reported instances of severe toothache after intravenous injection of the "A" drug, but this was not observed among our 20 cases.

Some of the cases received the "A" drug intramuscularly in some instances because, being infants, the intravenous method was too difficult, and in others (adults) because a comparison with the bismuth drug which has been in use in Haiti during the past year (a 10 per cent aqueous solution of sodium potassium bismutho tartrate) was desired in respect to local pain and inflammatory changes caused by intramuscular injections. While the matter of pain is, of course, extremely difficult to measure, except in a very general way, it was the definite impression that the "A" drug given intramuscularly caused less pain than either the "B" drug or the sodium potassium bismutho tartrate, this notwithstanding the fact that the "B" drug is claimed to be specially designed for comparatively painless intramuscular use. The fact that the "B" drug contains more than three times as much bismuth per cubic centimeter as the "A" may be responsible for this, the differences in respect to pain being due to quantitative rather than qualitative features of the drugs.

One case, No. 10, was a woman belonging to the more intelligent and educated class of Haitians. She received more consecutive weekly injections (13 in number) than we have ever been able to give to any patient with other bismuth drugs (because of local pain) and she never offered a complaint concerning pain.

Either drug given intramuscularly resulted frequently in one or two days of moderate fever, and the conclusion is that this fever was due to local inflammation, since fever did not follow the intravenous injections.

² Lieut. (Junior Grade) C. D. Middlestadt (M. C.), United States Navy, in personal communication.

Severe stomatitis was observed in two cases receiving the "B" drug, but it disappeared within a few days after the drug was discontinued.

As for therapeutic results, it can be said without reservation that these were highly satisfactory. In every one of the 40 cases the lesions became healed. The case requiring the greatest number of injections to accomplish this was that of No. 16, who received 17 injections. Although her ulcer was of comparatively short duration (3 months) it was of considerable size (4 by 3 inches and about 1 inch in depth) and prevented walking until after the fifth injection. Other cases here are under treatment with these bismuth-yatren drugs whose ulcers have not yet healed, but they have been under treatment for relatively short periods and their ulcers are in the process of healing with the same rapidity as was noted in the cases reported.

A peculiar feature about these ulcers is that they nearly always heal more rapidly during the early weeks of treatment than later. After the first two or three injections they are sometimes reduced to a third or fourth of their original size and then remain almost stationary for several weeks, finally healing over at the end of the third or fourth month of treatment. This tendency has been observed during treatment by these bismuth-yatren drugs as well as with other bismuth drugs and arsenicals.

It is quite impossible to make any sort of definite comparison of the therapeutic value of these drugs with other bismuth drugs and arsenicals. The early skin lesions heal very rapidly with any of these drugs. The "rheumatic" type of yaws cases which are benefited by other bismuth drugs and arsenicals would presumably be equally benefited by the bismuth-yatren drugs. Although several cases of the "crabe" type were given Bismuto-Yatren A at first, none of them were followed up, as they were not hospitalized, and although there is no proof that they were benefited it seems reasonable to suppose that they were helped just as much as they would have been by an equivalent amount of treatment by other bismuth preparations or arsenicals. As for the ulcer cases it can only be said that they respond equally well with any of these drugs. In studying the tables, as well as from impressions received while inspecting these ulcers from week to week, it appears that, in general, the healing was most rapid in those cases receiving the Bismuto-Yatren B. The probability is that the question here is simply one of bismuth dosage, the adults receiving 72 milligrams of bismuth per injection of the "B," and only 30 milligrams per injection of the "A." The fact that two severe cases of stomatitis occurred in the "B" series suggests that the difference in bismuth dosage in the two drugs is an important one.

In July, 1926, in a report to the Sanitary Engineer of Haiti, the writer expressed the opinion that while these bismuth-yatren drugs gave highly satisfactory results in the treatment of yaws, they were inferior to the arsenicals in this regard. Since that time the records of many of our ulcer cases receiving neoarsphenamine and sulpharsphenamine have been studied, as a result of which this opinion is no longer held. Many ulcers of varying sizes and durations have been just as slow to respond to treatment by arsenicals as with these bismuth drugs, and for every case where the healing was unbelievably rapid with one drug we have cases where it was equally rapid with another.

In every single case of yaws ulcer we know that healing will occur if treatment is continued regularly over a sufficiently long period with either arsenicals or bismuth, and this is rarely longer than six months.

The factor of pain in these injections is of great importance in Haiti, since the great advantage of a painless drug is that it will not discourage patients from receiving an adequate amount of treatment. The sort of "mass treatment" which we are obliged to practice here will always necessitate an intramuscular route, and the nearer we come to a drug which is therapeutically effective and practically painless intramuscularly the more we shall succeed in getting the yaws population of Haiti to take sufficient treatment, and the farther we shall go toward achieving something in our long war on Haitian treponematosi.

Case number	Age	Duration of lesion	Character of lesion	Treatment	Results
1	8	4 weeks.....	Face and body covered with secondaries.	2 c. c. A; 3 injections.	Lesions disappeared after second injection.
2	30	6 months....	Secondaries on face; enlarged cervical glands.	3 c. c. A; 2 injections.	Lesions disappeared 10 days after first injection.
3	6	3 weeks.....	Primary on lip.....	1 c. c. A; intramuscular; 2 injections.	Lesion disappeared 5 days after first injection.
4	6	3 months...	Primary on lip, 1½ inches diameter.	1 c. c. A; 4 injections, intramuscular.	1 week after first injection reduced to one-third original size. Healed one week after third injection.
5	1	2 months...	Primary on lip.....	1 c. c. A; intramuscular; 2 injections.	Healed one week after first injection.
6	18	1 year.....	Ulcer over left internal malleolus, 1 inch diameter.	3 c. c. A; 3 injections.	Healed one week after second injection.
7	42	5 years.....	Ulcer over left tendo achilles, 1½ inches diameter.	2 c. c. A; 3 injections.	Healed 3 days after second injection.
8	12	2 years.....	Ulcer over left tibia, 2 inches diameter.	1 c. c. A; intramuscular; 6 injections.	1 week after third injection, reduced to one-half original size. Healed one week after fourth injection.
9	49	.....do.....	Ulcer, dorsum right foot, 4 by 3 inches.	3 c. c. A; 6 injections.	Healed one week after fifth injection.
10	39	2½ years....	Ulcer above right external malleolus, 6 by 4 inches.	2 c. c. A; intramuscular; 13 injections.	Healed to one-third original size one week after third injection. Healed one week after thirteenth injection.

Case number	Age	Duration of lesion	Character of lesion	Treatment	Results
11	60	8 months...	Circular ulcer, scrotum, 6 inches diameter.	2 c. c. A; 4 injections.	Healed one week after second injection.
12	18	5 months...	Circular ulcer, posterior left leg, 1½ inches diameter.	3 c. c. A; 5 injections.	Shallower after second injection; three-fourths inch diameter one week after fourth injection. Healed one week after fifth injection.
13	19	3 months...	3 leg ulcers, each 1 inch in diameter.	3 c. c. A; 3 injections.	Healed one week after second injection.
14	37	2 years.....	Multiple ulcers, right buttock, right elbow, left forearm.	2 c. c. A; 3 injections.	Do.
15	22	1 year.....	Ulcer over right tibia, 5 by 3 inches.	3 c. c. A; 8 injections.	3 by 2 inches one week after third injection; 1 inch diameter one week after sixth injection. Healed one week after eighth injection.
16	28	3 months...	Ulcer above right ext. malleolus, 4 by 3 inches, 1 inch deep. Unable to walk.	2 c. c. A; 17 injections.	3 by 2 inches and shallower 1 week after first injection; walking after sixth injection; 1 by 1 inch after thirteenth injection. Healed after seventeenth injection.
17	29	7 months...	Ulcer above right ext. malleolus 4 by 2 inches.	2 c. c. A; 10 injections.	1½ inches diameter after sixth injection. Healed one week after tenth injection.
18	5	7 months...	Ulcer over left tibia, 4 by 4 inches.	1 c. c. A; intramuscular; 6 injections.	Shallower after third injection; 1 inch diameter after fifth injection. Healed one week after sixth injection.
19	26	6 weeks.....	Primary, either side of neck.	2 c. c. A; 3 injections.	Healed one week after third injection.
20	50	1 year.....	About 30 small ulcers covering area 9 by 9 inches, right leg.	2 c. c. A; 4 injections.	Do.
21	16	4 months...	Ulcer, 3 by 2 inches, over angle of jaw, right and left.	2 c. c. B; 5 injections.	Healed one week after fourth injection.
22	16	2 months...	Ulcer above left external malleolus, 1 inch diameter.	2 c. c. B; 8 injections.	Do.
23	12	2 years.....	Ulcer above left internal malleolus, 4 by 4 inches.	1 c. c. B; 10 injections.	Healed one week after ninth injection.
24	18	.....do.....	Ulcer below right internal malleolus, 4 by 3 inches.	2 c. c. B; 5 injections.	Healed one week after fifth injection.
25	18	.....do.....	Ulcer, inner aspect left calf, 5 by 3 inches.	2 c. c. B; 9 injections.	4 by 3 inches one week after third injection; 3 by 2 inches one week after fifth injection. Healed one week after ninth injection.
26	15	1 year.....	Multiple small ulcers, left leg and about left elbow.	2 c. c. B; 2 injections.	Healed three days after second injection.
27	12	.....do.....	Multiple ulcers, dorsum, left foot.	1 c. c. B; 4 injections.	Healed one week after second injection.
28	15	1½ years....	Ulcer, outer aspect left calf, 3 by 2 inches.	1 c. c. B; 9 injections.	Healed one week after seventh injection.
29	16	6 months...	Ulcer, outer aspect left calf, 3 by 2 inches.	1 c. c. B; 4 injections.	Healed one week after fourth injection.
30	16	4 years.....	Multiple small ulcers involving almost entire left leg and thigh.	.....do.....	Do.
31	20	8 months...	Ulcer over right tibia, 4 by 2 inches.	2 c. c. B; 2 injections.	Healed with miraculous rapidity. Healed in two weeks after beginning treatment.
32	19	1 year.....	Ulcer below right internal malleolus, 1½ inches diameter.	2 c. c. B; 3 injections.	Healed one week after third injection.
33	26	3 months...	Ulcer, dorsum, right foot, 2 inches diameter.	.....do.....	Healed one week after second injection.
34	20	3 years.....	Ulcer, posterior aspect left leg, 8 by 8 inches.	2 c. c. B; 10 injections.	5 by 2 inches after fifth injection. Severe stomatitis after seventh injection. Healed one week after tenth injection.
35	15	1 year.....	Ulcer, outer aspect right calf, 2 by 3 inches.	1 c. c. B; 12 injections.	No decrease in size until after sixth injection, though shallower. Healed one week after twelfth injection.

Case number	Age	Duration of lesion	Character of lesion	Treatment	Results
36	30	1 year.....	Ulcer, outer aspect right calf, 4 by 2 inches.	2 c. c. B; 9 injections.	Healed one week after eighth injection.
37	15	5 months....	Ulcer over right tibia, 2 by 1½ inches.	1 c. c. B; 8 injections.	Do.
38	18	4 months....	Ulcer over right tibia, 3 by 1 inches.	2 c. c. B; 6 injections.	Dryer and shallower after third injection. Healed islands after fourth injection. Healed one week after fifth injection.
39	18	1 year.....	Ulcer over left tibia, 1 inch diameter.	2 c. c. B; 7 injections.	Healed one week after sixth injection.
40	15	5 months....	Ulcer over right tibia.....	1 c. c. B; 5 injections.	Healed one week after fifth injection.

A CASE OF ADDISON'S DISEASE WITHOUT THE USUAL PIGMENTATION OF THE SKIN

By E. C. WHITE, Commander, and W. F. JAMES, Lieutenant (Junior Grade), Medical Corps, United States Navy

Addison's disease, as first described by Addison in 1855, is a rare symptom complex due to an insufficiency of the suprarenal glands or other parts of the chromaffine system. It is characterized by marked asthenia, a peculiar pigmentation of the skin, and disturbances of the functions of the stomach and intestines. The most common symptom, and the one that usually leads to the diagnosis, is the pigmentation of the skin. The bronzing begins on the exposed parts of the skin, but later spreads to involve the entire surface of the body, including the mucous membranes. The coloring is not uniform, however, as irregular white patches are often present. The skin at first takes on a light brown or yellowish hue, later becoming darker, until the color is a grayish or greenish brown. The mucous membrane of the lips, cheeks, gums, and tongue may show pigmentation, but not so commonly as the skin.

Addison's disease is more frequent in men than in women, and in the decades between 20 and 40. Tuberculosis is by far the commonest cause of the destructive process in the suprarenal glands, but syphilis and other inflammatory processes, as well as bilateral neoplasms, may be responsible for the development of the Addisonian syndrome. Of Conybeare's (1) series of 29 cases, tuberculosis was listed as the pathological lesion in 22; simple atrophy in the other 7. Of Rowntree's (2) series of 47 cases, 9 came to autopsy. In 8, tuberculous lesions were found, while in the other 1 the process was one of high-grade atrophy.

As an immediate causative factor, Rowntree feels that influenza plays a very important part. As a predisposing factor there is a congenital inferiority of the chromaffine system as a whole. Where this is marked the condition of status thymico-lymphaticus will

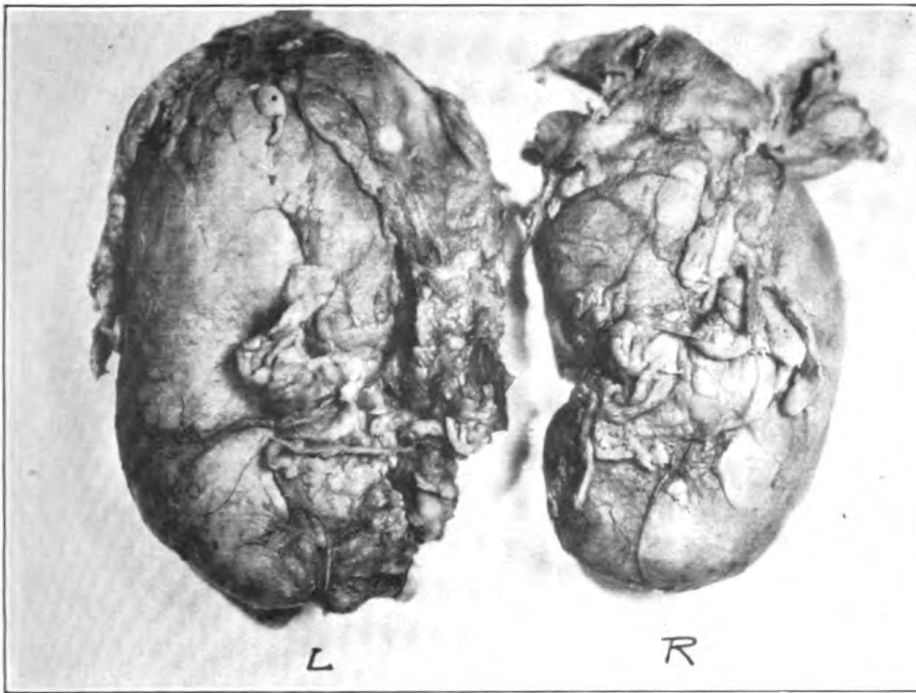


FIG. 1.—SUPRARENAL GLANDS (P. J. H., V. B. P.)

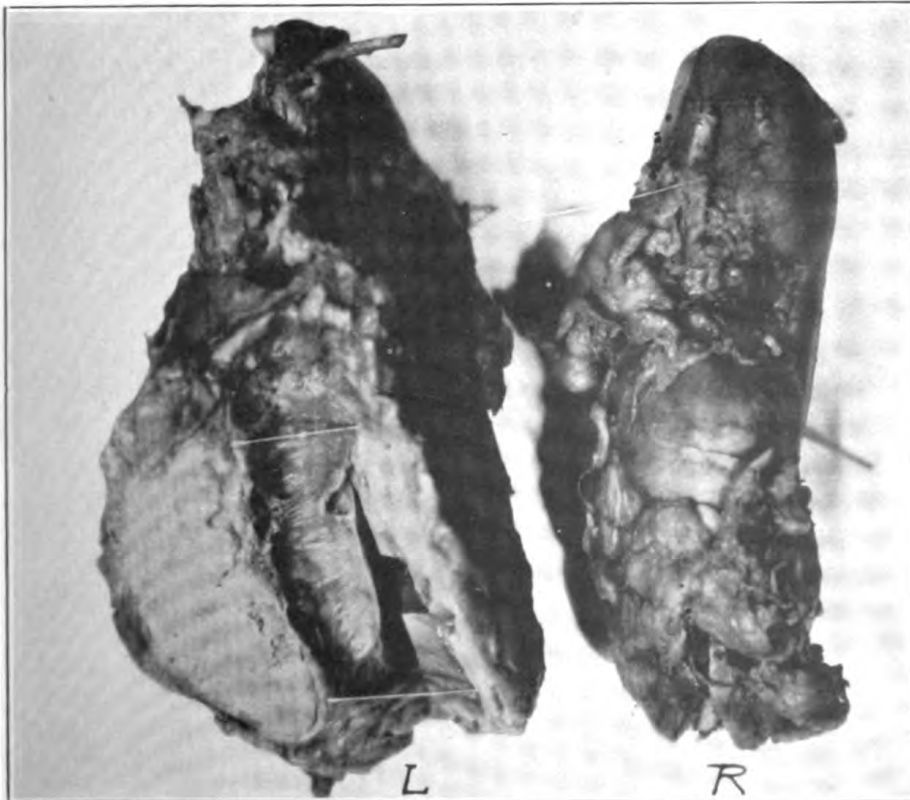


FIG. 2.—SAME GLANDS INCISED



result, and we would expect most of our cases of Addison's disease to be of this type. The thymus was investigated in the case reported below and found to be under, rather than over, normal size.

CASE REPORT

P. J. H. (V. B. P.); aged 35 years. Admitted July 9, 1926, as with chronic myocarditis.

Chief complaint.—Anorexia, weakness, rapid loss of weight, pain in left side, frequent dizzy spells, usually brought on by exertion, and precordial pain or discomfort.

Family history.—Negative.

Past history.—Usual childhood diseases; diphtheria at 7 years of age; pleurisy and pneumonia at 18; gonorrhea in 1918 and 1925; chronic constipation for the past two years. Six months ago had several night sweats and a nonproductive cough for a short time.

Present illness.—Patient felt well until about one month ago, when he noticed that he became easily fatigued and much weakened upon the least exertion. His appetite decreased and he lost weight rapidly. He had frequent dizzy spells which were brought on by the least exertion. Shortly before admission the patient contracted an acute bronchitis, which left him with pleuritic pains in his left chest.

Physical examination.—A white male, about 35 years of age, who does not appear acutely ill. Temperature, 97°; pulse, 88; respiration, 20; blood pressure, systolic 88, diastolic 60. Patient appears anemic, and entire body surface is pale. Skin is soft and of a fine texture. Scar in right temporal region as the result of a head injury during childhood. Teeth show numerous caries and are in poor condition generally.

Thorax.—Borders of heart dullness are within normal limits. Heart sounds are faint and distant, both at apex and base. No murmurs present. The lungs show less expansion on the left side than on the right. A friction rub is heard on the left side in the mid-axillary line at the level of the seventh rib. Upon deep inspiration pain is noted in the same area. Over the apices the percussion note is dull and the breath sounds are bronchovesicular in type. No râles heard.

Abdomen.—Soft, with no masses or pulsation. The liver dullness is within normal limits upon percussion. The spleen is somewhat enlarged and palpable upon deep pressure.

Laboratory examination—Blood.—Red blood cells, 4,100,000; white blood cells, 9,900; hemoglobin, 80 per cent; neutrophils, 51 per cent; lymphocytes, 45 per cent; eosinophiles, 4 per cent. Wassermann test, negative; Kahn test, negative.

Urine.—Clear; straw; acid; sp. gr., 1.020. Albumin, negative. Sugar, negative; few leucocytes. Three days later a few hyaline casts were noted, and these were found at all subsequent examinations. Albumin was never present and the specific gravity did not vary.

Electrocardiogram.—Negative, except that all waves were of low amplitude in all three leads.

X-ray examination of chest.—Peribronchial infiltration characteristic of fibrocaceous tuberculosis. Infiltration is almost broncho-pneumonic in character and involves the vertebral and first intercostal trunks on both sides.

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The remainder of the chest shows some slight infiltration around the hilar shadows. The heart is slightly displaced to the left and is of the ptotic type. There are basal adhesions around the right diaphragm and the pleura over the right lower lobe is thickened.

X-ray diagnosis.—Fibrocaceous tuberculosis, second stage, mixed infection. Width of chest, 29.5 cm. Width of heart, 10 cm. Length of heart, 16 cm. ML, 6.5 cm. MR, 3.5 cm. Arch, 4 cm.

Course of the disease.—The patient's condition grew rapidly worse. The heart sounds were so weak and distant that the possibility of a pericarditis with effusion was considered until after the X-ray report. He refused food but did not vomit. The most striking symptom was the extreme asthenia. So weak was he that he was unable to talk, and if an effort was made to put him in an upright position, his pulse became very weak and irregular, and a condition that was almost collapse developed. He was unable to raise his arms or his legs. The profound muscular asthenia was out of all proportion to the pulmonary tuberculosis which was found to be present. So low was the blood pressure that it could not be accurately recorded.

There was no pigmentation whatever on any part of the skin or mucous membrane, and the true condition was not suspected ante mortem. Without developing any new symptoms, but with the asthenia becoming more pronounced from day to day, he gradually went into a state of collapse and died on July 26, 1926. This was 17 days after his admission to the hospital and about 7 weeks after the onset of the disease.

Post-mortem findings.—The body was that of an adult white male, 35 years of age, well nourished and developed, weighing about 150 pounds. Moderate rigor mortis present. The entire surface of the body was pale, being somewhat anemic in appearance. The skin was soft. The ventral incision was made from the episternal notch to the symphysis pubis.

Thoracic cavity.—The pleural cavity contained no free fluid. The left apex was surrounded by many strong fibrous adhesions and contained many tubercles, some of which had undergone caseous degeneration. The lower lobe was practically normal in appearance, except for a slight congestion. The right lung was completely surrounded by fibrous adhesions. The upper and middle lobes were studded throughout with tubercles. Upon cut section, the lung tissue showed many tubercles, and a small amount of bloody fluid was scraped away with the knife. Both lungs showed a moderate degree of anthracosis. Neither lung showed evidence of consolidation.

The pericardium contained about 100 c. c. of straw-colored fluid.

The heart was normal in size and appearance, except for a fibrinous pericarditis. The heart valves were normal, as were the coronary arteries and the great vessels.

The thyroid and thymus glands were normal in size and appearance.

Peritoneal cavity.—The omentum was normal. The liver was normal in size, but showed chronic passive congestion. The gall bladder was normal in size, but distended with bile. The bile ducts were normal. The spleen was slightly enlarged, dark red in color, soft, and friable. The pancreas was normal in size and appearance. The stomach, intestines, appendix, and rectum were normal throughout. The mesentery was normal.

The suprarenals on both sides were greatly enlarged. The left was three times its normal size, while the right was twice its normal size. They were in their normal position, but bore no resemblance whatever to normal glands. They appeared as irregular nodular masses surrounded by perirenal fat, and,

upon palpation, were very firm. On section the normal tissue was seen to be replaced by a fibrous capsule inclosing firm grayish fibrous-like tissue which surrounded areas of soft, caseated material. These caseated areas varied from a white to a yellow color, and were surrounded to a great extent by fibrous tissue. The entire structure of the suprarenal on both sides was involved. None of the normal tissue remained in either gland. The whole structure on each side was embedded in fat.

The left kidney was one and one-half times the normal size, and, upon cut section, showed a number of small tubercles, some of which were caseous in character. The normal tissue was replaced to a great extent by fibrous tissue. The right kidney was normal in size and showed no abnormalities.

The ureters, bladder, prostate, and urethra were normal.

Smears made from the suprarenal glands showed many tubercle bacilli.

Microscopical examination—Lung.—The section shows the common tuberculous tissue with the characteristic giant cells here and there. Suprarenal—no normal suprarenal tissue could be found in the section. The tissue was that characteristic of tuberculosis.

After noting the condition of the suprarenals, the pathologist carefully reexamined the skin for evidence of an overlooked pigmentation, but none was found.

Pathological diagnosis.—1. Fibrocaceous pulmonary tuberculosis. 2. Tuberculosis of both suprarenals. 3. Fibrinous pericarditis. 4. Tuberculosis, right kidney.

COMMENT

The case of Addison's disease reported ran an unusually short course—seven weeks. In Rowntree's series the average duration of the 13 who had died was 16½ months. The shortest duration was six weeks and the longest three and one-half years. Conybeare states that the duration is shorter in those cases due to tuberculosis.

The absence of pigmentation was the most unusual feature and prevented a diagnosis from being made before death. Pigmentation was absent in two of Conybeare's 29 cases, and the condition is mentioned by others, but there is no adequate explanation of it. In other reported cases the reverse condition has been found—all the symptoms of Addison's disease being present, while the suprarenals are found to be uninvolved. The most logical explanation of these conditions would seem to be that of Wiesel. Outside of the suprarenal there is much chromaffine tissue, particularly in the paraganglionic nodules. Destruction of the suprarenals does not necessarily involve destruction of all the chromaffine tissue. On the other hand, destruction of extrasuprarenal chromaffine tissue or of the sympathetic system that innervates it, as held by Nensser, may cause Addison's disease without destruction of the suprarenal glands.

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SCURVY

REPORT OF CASE

By L. J. ROBERTS, Lieutenant Commander, Medical Corps, United States Navy

A century ago scurvy was the scourge of the maritime world. With the advancement of knowledge as to its etiology and the means of its prevention its incidence on board steam vessels is now almost negligible and in the United States Navy it is extremely rare. The records of the Bureau of Medicine and Surgery show that during the period of 30 years, from 1895 to 1924, inclusive, 12 cases of scurvy were reported as occurring in the Navy. These were distributed by years as follows: 1896, one; 1900, one; 1904, three; 1908, one; 1917, four; and 1918, two.

While the number of cases is small the possibility of the occurrence of the disease in the Navy, when the peculiar conditions fostering its development are allowed to arise, is illustrated by the following case report.

CASE REPORT

H. E. J., seaman, second class, aged 19, was admitted to the naval hospital, Pearl Harbor, T. H., on June 1, 1925, with a diagnosis of cellulitis, left knee. He complained of hemorrhage from the gums, pain in the chest, and pain, swelling, and discoloration of the left knee.

The family history was unimportant.

He had been in the Navy for two years. His habits were good, except his dietary habits. He stated that ever since early childhood all fruits and vegetables, except potatoes and carrots, had been distasteful to him; that these were the only ones he would eat; and that he would sooner go without food than eat other fruits or vegetables.

He stated that he had always been well until four or five months prior to admission, at which time he developed gonococcus infection of the urethra with a discharge of three weeks' duration. Besides the routine treatment for this condition he had received three intravenous injections of mercurochrome about six weeks prior to admission.

On February 10, 1925, about three and one-half months prior to admission and about two months prior to the onset of the earliest symptoms, the patient was confined in the brig of one of our modern battleships. He was confined there continuously until May 9, 1925, or a period of three months. His statement that during this time he rarely had access to sunlight and that the only vegetable which he ate during that time was an occasional potato is assumed to be correct. All other fruits and vegetables which were given to him he refused.

Early in April, about one month before he was released from confinement, the patient first noticed pain in the back and at the same time a swelling and softening of the gums. Following this he noticed that he was growing progressively weaker. On May 6 he accidentally received a slight blow on his left knee, and it began to swell. He tried to carry on, but grew so weak that he could no longer do so and reported his condition to a medical officer. In addition to the above symptoms, the swollen gums had by this time begun to

bleed, there was pain over the ribs, some epigastric pain after eating, and nocturia once nightly. The patient was not constipated. From the time he was first treated by a medical officer early in May until his admission to this hospital on June 1 he had received local treatment for the injured knee and a tonic.

Physical examination at the time of admission revealed a well-developed young white man who appeared fairly well nourished. The skin was dry and there was a brownish pigmentation of the face, arms, and neck (probably sunburn). The mucous membranes were extremely pale. The eyes showed the bluish white sclerae of anemia, but were otherwise normal. There were numerous carious teeth. The gums were spongy and presented a few hematomata. They bled easily. Otherwise the mouth and throat were normal. The neck appeared normal. The glandular and vascular systems were essentially negative. The pulse was of very low tension. Inspection and palpation of the chest revealed the fact that the costochondral articulations were enlarged and tender. The lungs were essentially negative. The abdomen was generally tender but otherwise normal. Examination of the extremities revealed the typical bluish discoloration of subcutaneous hemorrhage over both knees. The left knee joint space contained fluid which, though not aspirated, was thought to be blood. Both joints were painful and tender.

The temperature on admission was 103, the pulse 90, and the respiration 20.

Urinalysis made at this time revealed nothing abnormal.

The blood picture was as follows:

Hemoglobin.....	26 per cent (Sahli).
Erythrocytes	1,560,000
Leucocytes	2,500

Differential

Polymorphonuclears	45 per cent.
Lymphocytes.....	47 per cent.
Transitionals and large mononuclears.....	6 per cent.
Eosinophiles	2 per cent.

The red blood cells show anisocytosis, slight poikilocytosis, polychromatophilla, and an occasional cell showing basophilic stippling. An occasional normoblast is found. The blood platelets appear normal. Coagulation time $3\frac{1}{2}$ minutes. Bleeding time, $2\frac{1}{2}$ minutes.

A blood culture showed no growth.

A diagnosis of pernicious anemia was considered at this time but, in view of the suggestive history and the physical findings, the probable diagnosis was scurvy. Mercury poisoning, due to the use of mercurochrome, was discarded as a likelihood when the fact was elicited that the initial symptoms antedated the administration of mercurochrome.

The patient was placed on a soft diet, with whatever fresh vegetables he could be persuaded to eat, and given orange, lime, or lemon juice three times daily. No other therapeutic measures except rest were used at this time although, later, cod-liver oil was given.

His improvement was immediate and striking. Within 10 days of his admission the temperature was normal. The gums were nearly clear and the swelling of the knee was subsiding. The blood picture

also rapidly improved. Twenty-nine days after admission the hemoglobin had risen from 26 per cent to 60 per cent, and the results of the therapeutic test were considered sufficiently conclusive to warrant a diagnosis of scurvy. On August 7, 1925, the hemoglobin was 90 per cent, and the patient was returned to duty well.

COMMENT

The circumstances surrounding the development of the disease in this instance are unusual, in that the patient refused some of the antiscorbutic foods when they were served to him in the brig. The case does, however, illustrate the necessity for frequent careful inspection of prisoners serving long sentences. Their diet should be carefully supervised and the medical officer should see to it that they receive a daily airing on deck. The disease is insidious in its onset and a sporadic case is likely to occur from time to time and reach an advanced stage unnoticed, unless the possibility of its development is kept in mind. •

EARLY PULMONARY TUBERCULOSIS WITH NEGATIVE X-RAY FINDINGS

By J. D. BLACKWOOD, Jr., Lieutenant, Medical Corps, United States Navy

Among tuberculosis workers there is a difference of opinion as to the absolute value of the X ray in the diagnosis of early tuberculosis. Some claim that tuberculosis may be diagnosed before the X ray will show the lesion and others disagree.

When the writer was placed on duty in the tuberculosis wards of the naval hospital at Washington, D. C., he asked the roentgenologist how early tuberculosis of the lungs could be diagnosed by X ray. The answer was, "Sooner than it can be diagnosed by physical examination."

We are in a mechanical age. What with our X-ray machines, electrocardiographs, various scopes, etc., the field of medicine has been invaded, and with great benefit to both patient and physician. But, unfortunately, the naval medical officer is frequently called upon to serve where these aids are not always available. Let it be understood that the writer is not decrying the use of these aids, because he looks upon the X ray, especially, as frequently of value as an antemortem autopsy; but, are we not neglecting, due to these labor-saving devices, what has been tried in the past and not found wanting—the art of physical diagnosis?

The following cases (previously presented before the American Congress on Internal Medicine) may prove of interest, since the diagnoses were made by physical examination in conjunction with

the histories, and were confirmed by the finding of tubercle bacilli in the sputum, although the patients presented negative X-ray pictures.

Case 1.—J. B. W., private, United States Marine Corps, on November 6, 1921, was admitted to the sick list with bronchitis, acute. Three months later, and again in the following month, he was again admitted with bronchitis, acute. On this last admission he had pain in the chest and râles throughout the lungs. X-ray examination was negative and his sputum was negative for tubercle bacilli. About one and one-half years later (September 11, 1923) he was admitted as a tuberculosis suspect, with cough, malaise, weakness, T. 100°, loss of weight, and negative physical findings, except for slight bronchial breathing below the right scapula. He gave a history of death from tuberculosis of his mother and three other members of his family and a personal history of frequent attacks of bronchitis during the past five or six years. About one month later (Norfolk hospital). X-ray findings being negative, his sputum negative for tuberculosis, and he having shown improvement in weight, the diagnosis was changed to bronchitis, chronic, and he was discharged to duty. Four months later he was again admitted as a tuberculosis suspect, with chronic cough, loss of 20 or 30 pounds in weight, slight afternoon temperature, and night sweats. Ten days later (Quantico) his sputum was positive for tubercle bacilli on three successive days. No physical findings were noted and his diagnosis was changed to tuberculosis, chronic pulmonary, active, moderately advanced. Upon admission, March 11, 1924, at the naval hospital, Washington, D. C., he gave the additional history of blood spitting in July, 1923.

Examination showed chest expansion better on the left, impairment down to the second rib, anteriorly, and in the suprascapular region, with bronchial breathing above the first rib, anteriorly, and bronchial breathing and increased vocal resonance above the spine of the scapula on the right.

Nose and throat.—Normal.

Blood.—Normal, except for slight increase of lymphocytes, 38 per cent.

Noguch.—Negative.

Urine.—Normal, except for slight trace of albumen and an occasional hyaline cast and cylindroid.

T. P. R.—Normal range during 25 days.

Sputum.—Negative for tuberculosis while at this hospital.

X ray.—Lung fields symmetrical and well expanded. Apices appear to be clear. Few scattered areas of calcification at hilum. Otherwise negative.

This case gave a family history of tuberculosis; had frequent colds, loss of weight (varying), pain in the chest, chronic cough during two and one-half years, blood spitting, impairment, bronchial breathing and increased vocal resonance at the right apex (not physiological), and had shown tuberculosis in the sputum. Twice X-ray examination was negative.

The history and findings justified the diagnosis of tuberculosis.

Case 2.—C. C., V. B. P., admitted for observation September 6, 1923. Gassed in 1918; influenza, 1919; pneumonia (?), 1919, pleurisy left side, 1919. Since 1919 has felt weak and has had a cough, blood spitting at times, slight loss of weight, night sweats, pains in the chest and between the shoulder blades, and dyspnoea.

Physical examination.—September 7, 1923. Impairment on the right side down to the first rib, anteriorly, and in the suprascapular fossa posteriorly.

There was bronchial breathing above the clavicle on the right and bronchovesicular breathing below to the second rib. Posteriorly, there was weak bronchovesicular breathing in the suprascapular fossa, with an occasional sibilant r le, which could not be traced to one of the larger bronchi.

X ray.—September 10, 1923. Apices clear, lung fields clear, costophrenic sinuses clear.

Sputum.—The next day the sputum was positive for tubercle bacilli. Eventually they were found in four specimens. Another X-ray examination was requested and the R ntgenologist was told about the positive sputum. On September 13, 1923, he reported the same negative findings as before. Blood, urine, and Noguchi reaction showed nothing abnormal. The patient was observed for two and one-half months, during which time he had a typical saw-tooth temperature chart showing an evening rise to 99 plus or 100  F.

The diagnosis in this case was made on the history of blood spitting, pains in chest, night sweats, and slight loss of weight, together with the physical signs noted. It was confirmed by the presence of tubercle bacilli in the sputum (four specimens) and the typical temperature chart during a period of two and a half months. Twice X-ray examinations were negative.

Case 3.—McC. J. L., V. B. P., admitted to United States Naval Hospital, Washington, D. C., November 3, 1925. Blood spitting, cough, burning sensation in chest. Family history was negative. In 1920 he developed a cough and pain in the chest. He was in a hospital for one month and was discharged with the diagnosis of arrested pulmonary tuberculosis. October 31, 1925, he developed chills, fever, sweats, and a slight cough. Three days later he developed blood-tinged sputum, which continued for the next two days. There was no hemorrhage. A burning sensation in the chest, anteriorly, also developed. There was no loss of weight.

Physical examination.—Elicited an impairment on the right side down to the first rib, anteriorly, and down to the midscapula, posteriorly. Anteriorly, on the right, there was a vesiculobronchial type of breathing along the superior bronchus, accompanied by sticky r les. There were also crepitant r les in the fifth interspace, anteriorly. The diagnosis of infiltration along the right superior bronchus was made.

X ray.—November 7, 1925. Lung fields and apices clear. Certain amount of density at the hilum. Costo-diaphragmatic angles are clear.

Nose and throat examination, including sinuses, was negative.

Blood, Wassermann, Kahn, stools, urine.—Nothing pathological.

Sputum.—Positive for tubercle bacilli (two out of nine examinations).

Temperature, pulse, and respirations.—Normal course during 12 days' observation.

The diagnosis in this case was made upon the history of blood spitting, cough, fever, and sweats and the physical signs of impaired resonance, vesiculobronchial breathing, and sticky r les along the superior bronchus, not due to disease in the upper respiratory passages. The diagnosis was confirmed by the finding of tubercle bacilli in the sputum twice. The X-ray findings were negative.

My thanks are due to Lieut. Commander R. W. Hutchinson, Medical Corps, United States Navy, for his cooperation in the study of these cases. Although justly proud of his specialty and of his

ability as a roentgenologist, which the writer acknowledges, and knowing that the cases were proved cases of tuberculosis, yet he interpreted his pictures without prejudice.

The writer also wishes to acknowledge that on a number of occasions Doctor Hutchinson has been able to demonstrate on his X-ray plates slight, deeply seated, healed lesions in the left upper lung field over which the writer was unable to elicit any pathological signs, even upon reexamination after having seen the pictures.

CHOLECYSTOGRAPHY

OBSERVATIONS BASED ON A SERIES OF 50 CASES

By O. B. SPALDING, Lieutenant, Medical Corps, United States Navy

Oral administration of the sodium salt of tetrabromphenolphthalein, or preferably tetraiodophenolphthalein, as the latter salt has a greater affinity for X rays and casts a denser shadow on the plate, has been adopted as the routine procedure in all gastrointestinal examinations where there is any suspicion of gall-bladder involvement.

Instead of using any of the prepared enteric coated capsules that have recently appeared on the market under various names, it is advisable to purchase the salt in small quantities to insure the absence of chemical change due to exposure to light and changes of temperature. Ordinary gelatine capsules containing $7\frac{1}{2}$ grains of the salt are coated with salol. The capsules are made up shortly before they are to be used, and a small amount of agar in each capsule will insure liberation of the salt. The commercial enteric capsules sometimes fail to dissolve and are seen on the plate as opaque foreign bodies.

Preparation of the patient.—No preliminary preparation of the bowels if a gastrointestinal examination is to be made. A special meal is given at 6 p. m., consisting of tea without milk, plain toast, and poached eggs. During the meal the patient is instructed to take from four to six capsules, each containing $7\frac{1}{2}$ grains of the salt. If the weight of the patient is less than 120 pounds, four capsules; if less than 150 pounds, five capsules; and if over 150 pounds, six capsules. One-half hour following the meal 30 grains of bicarbonate of soda dissolved in a glass of water is given. Patient is placed in bed and told to lie on the right side as much as possible. He is warned to expect slight nausea. If there is any gastric distress, the bicarbonate of soda may be repeated in one hour. The patient may have a small amount of water up to midnight. The following morning nothing by mouth. Plates are taken

at 8, 12, and 4 p. m. If a normal shadow is seen at 8 and 12, a meal containing fat is given at 3 o'clock. Plates taken at 4 o'clock should show a negative shadow. This constitutes a functional test. The accuracy of this test has been repeatedly demonstrated in normal cases. In one case of a volunteer food was withheld for 50 hours. Plates taken at 4, 8, 12, 24, 32, and 48 hours showed a normal shadow. A full meal was given at 50 hours, and plates taken at 52 hours failed to reveal a shadow.

If a gastrointestinal examination is to be made, gall-bladder plates are taken at 8 and 9 a. m., followed by the routine gastrointestinal examination.

In cases where there is fluoroscopic evidence of possible adhesions in the neighborhood of the duodenum and gall bladder, serial plates will show the relation between the shadow of the gall bladder, the barium filled duodenum, and the hepatic flexure of the colon.

In some cases, where there is definite clinical evidence of gall-bladder pathology, the technique may be changed by giving a full meal containing fats at 6 p. m. At 8 p. m. the patient is told to take one capsule every 15 minutes until the requisite number, depending on the body weight, is taken. The patient is further instructed that he may expect slight nausea. Knowing what to expect, he will not attempt to gag; as a matter of fact, in the average case, there is little or no discomfort. If there is a reaction with nausea, vomiting, and occasional diarrhea, the reaction generally occurs after the second capsule; the test should then be discontinued. Bicarbonate of soda, 30 grains, is given one-half hour after the last capsule and repeated in one hour if there is any distress.

Irregularities in the gall-bladder shadow are suggestive of either adhesions or pressure from a neighboring organ. Adhesions may be reasonably excluded if the gall bladder empties itself completely following a meal containing fat. A mottled density is suggestive of gall stones. Cholesterin stones may appear as negative shadows. Failure to obtain a gall-bladder shadow is suggestive of obstruction of the cystic duct, either by stone or by adhesions. The test is not conclusive and should always be checked by the intravenous method.

A very satisfactory Röntgen technique for routine cholecystography follows: Use compression cone, without Bucky diaphragm, 60 ma., time, 0.3 of a second; vary penetration, depending on size of patient.

With Bucky diaphragm, 40 ma., time, 3 to 5 seconds; vary penetration, depending on size of patient. The patient is placed in the prone position and the central ray is directed over a triangular area formed by the costovertebral angle. Three exposures are made cov-

ering the area from the costovertebral angle to the iliac crest in order to obviate the possibility of missing a low placed gall bladder. Having located the gall-bladder shadow, the skin is marked to serve as a guide for subsequent serial plates. Satisfactory plates in a normal case should show a clear-cut, rounded shadow at 8 a. m. A shadow of less size but of greater density at 12 noon, and similar shadows at 24, 36, and 48 hours, unless a meal containing fats is given, when the shadow should disappear.

Intravenous cholecystography.—Following the publication by Graham and Cole of a series of articles on the intravenous administration of sodium tetrabromphenolphthalein, a series was made of 25 selected cases. The technique recommended by Graham and Cole was closely followed in the first five cases; in the later cases a slight change was made in the preparation and control of the patient. The following routine technique was found to be satisfactory.

Orders for the patient: Omit breakfast; omit lunch; may have water by mouth or glass of milk; omit fats from evening meal; instruct patient to lie on right side; give bicarbonate of soda (grains 40) every three hours day and night while awake, for 48 hours. If the crystalline sodium salt is used, $5\frac{1}{2}$ grams are added to 40 cubic centimeters of freshly distilled water sterilized in a boiling water bath for 15 minutes, and given in two doses at 7 and 7.30 a. m. If the patient weighs less than 120 pounds, the dose should be reduced accordingly. Care should be taken not to allow extravasation of the sodium salt into the arm, outside the vein, since necrosis is apt to result from it. It is best to give the first injection slowly, and after one or two cubic centimeters has been injected, wait from 2 to 5 minutes. If no reaction occurs, continue the injection. Care must be exercised in the selection of cases. They should be free from organic diseases of the liver, kidneys, and heart.

It may appear that undue stress is laid on the careful observation of the patient and food prevention between the time of the administration of the dye and taking the plates, but experience has proved that success or failure of the examination depends entirely on the careful control of the patient. Faulty shadows, or early disappearance of shadows, may be due to the patient surreptitiously obtaining food, and if this possibility is not taken into consideration an erroneous interpretation may be made. It will be seen that the dosage suggested in the oral method is about one-half that recommended by Graham, Cole, and others. The shadows obtained, while faint, are sufficient for diagnostic purposes, and as a result of the diminished dosage there is no nausea, vomiting, or diarrhea.

The oral method should be employed as the method of choice. If a negative gall-bladder shadow is obtained, and if a gastro-

intestinal examination points to pathology in the neighborhood of the gall bladder, the intravenous method should be used as a check. The intravenous method should not cause necrosis of the tissue or venous thrombosis if the dye is administered by an assistant skilled in the administration of intravenous therapy.

By employing either of the above methods of cholecystography we have a valuable aid not only in the diagnosis of pathological conditions in the neighborhood of the gall bladder but of the gall bladder itself, and also in estimating gall-bladder function.

SYPHILIS

REPORT OF AN UNUSUAL CASE

By B. W. HARRIS, Lieutenant (Junior Grade), Medical Corps, United States Navy

This report is given with the view of pointing out, first, the great difficulty in making a definite diagnosis on the first examination of a patient, particularly where no laboratory facilities are at hand; second, the dangers other members of the crew are subjected to unless the patient be isolated during the period while under observation.

The patient, J. R., engineman, second class, United States Navy, reported to the sick bay on board one of the destroyers composing the European detachment, March 29, 1926, complaining of swelling in the region of the right submaxillary gland with some tenderness on pressure.

Examination revealed quite marked swelling of the right submaxillary gland with less marked swelling on the opposite side. Teeth and tonsils were examined, but no evidence of infection found. There was a small abrasion of the mucous membrane of the upper lip. This did not at that time appear to be anything of importance, and patient claimed that it had appeared about 10 days previously and was due to letting a cigarette hang to the lip until it had burned short. He gave a history of exposure to venereal infection some four or five days previously and had entered his name in the book as having taken prophylaxis. Previous exposures were December 15, 1925, January 20, 1926, and February 3, 1926. There were no sores about the genitals and no other evidence of syphilis could be found.

A tentative diagnosis of abscess, submaxillary region, was made, and treatment, consisting of ichthyol ointment and heat, in the form of hot water bag and poultices, applied to the swollen area. These had no effect on the swelling. At one time it was thought slight fluctuation was detected and incision and drainage were recommended. This was later found to be a mistake and no surgical interference was undertaken.

On April 1 condition showed no improvement and patient was sent to the Italian Royal Naval Hospital, Venice, Italy. Here a blood Wassermann test was made. This was reported as being 4 plus and he was returned to the ship for treatment for syphilis. At this time both submaxillary regions showed marked swelling. He also showed a typical secondary rash, with palpable epitrochlear and cervical glands. The abrasion on the upper lip had formed a definite ulcer. Temperature was recorded as being 99.8; pulse, 92 on one occasion. Little doubt existed now as to the diagnosis of syphilis, and antiluetic treatment was started as soon as practicable, using neoarsphenamine, supplemented by iodide of mercury pills. Patient received six injections of neoarsphenamine and was given iodide of mercury pills, t. i. d., over a period of approximately six weeks. The ulcer on the lip began to show improvement immediately after treatment was instituted and swelling about the submaxillary region began to subside. At present it is practically all gone.

Patient returned to duty April 4, and, except for an impacted wisdom tooth which required extraction about one month later, has suffered no further trouble.

This case illustrates the importance of making early diagnosis of all sores, particularly those occurring about the mouth, for it has been noticed that notwithstanding the fact that the men have frequently been warned against the insanitary practice of receiving cigarette butts from other members of the crew this practice is still indulged in by some. Also, in extreme cases, where a shortage of buckets exists on board a destroyer, two or three men use the same bucket for bathing, scrubbing clothing, and even for washing their teeth. This, of course, leads to one of the worst sources for spread of infection where such exists among the crew. There is even stronger probability of men on foreign duty, in ports where the sanitary conditions are not the very best, contracting infection from glasses and other mess gear used on shore.

EXPERIMENTS WITH YAWS SERA AND THE KAHN PRECIPITATION TEST

By F. O. HUNTSINGER, Pharmacist, United States Navy

The serological analogy of yaws and syphilis is a matter of past record. In June, 1925, we resolved to compare the Noguchi complement fixation test and the Kahn precipitation test relative to reaction with sera from cases of yaws, well knowing that the Kahn test would react positively with positive sera, but not in what degree, compared to the usual complement fixation test.

The standard technic of Kahn was accurately followed, except that test tubes were not of standard size, they varying a trifle in

length and diameter, but not to an extent to cause difficulty. The Noguchi test as used at the United States Naval Medical School was employed in the comparison.

The following table showing tests recorded on 55 sera also shows comparison with the Noguchi.

[Total sera tested, 55]

No. of sera	Serum, 0.15 cubic centimeters			U. S. N. M. S. standard Noguchi						
	Antigen 0.0125	Antigen 0.025	Antigen 0.05	Negative	Anti-complementary	Doubtful	Positive			
							1+	2+	3+	4+
31	—	—	—	28	1	1	1	—	—	—
1	±	—	—	1	—	—	—	—	—	—
2	—	—	++	1	—	—	—	1	—	—
1	—	++	±	—	—	—	—	—	—	1
1	—	++++	++++	—	—	—	—	—	—	1
2	—	+++++	+++++	—	—	—	—	—	—	2
1	+	+	+	—	—	—	—	—	—	1
1	+	+	++++	—	—	—	—	—	—	1
1	+	+	++++	—	—	—	—	—	—	1
1	+	+	++++	—	—	—	—	—	—	1
1	++	++	++	—	—	—	—	—	—	1
1	++	++	++	—	—	—	—	—	—	1
1	++	++	++	—	—	—	—	—	—	1
4	++++	++++	++++	—	—	—	—	—	1	3
1	++++	++++	++++	—	—	—	—	—	—	1
2	++++	++++	++++	—	—	—	—	—	—	2
5	+++++	+++++	+++++	—	—	—	—	—	—	5
1	—	—	—	1	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	1

¹ Negative control.

² Positive control.

Judging from what has been recorded in these few tests, and presuming that additional tests will show no great degree of variation from these, it is definite that, in so far as differentiation between lues and yaws is concerned, no advantage is offered by the Kahn precipitation test.

Precipitation technics of workers other than Kahn were not used, but it is believed that comparative and proportional results would be approximately the same.

The 55 cases recorded herein range in age from 2½ to 61 years. The number of male and female donors were equally divided. History of yaws was present in all cases. All sera collected were from cases which showed manifestations of yaws. One-fourth of the number were suffering from primary infections. The remainder were recurrent cases, or cases in which cure had been apparently effected.

It is interesting to note that two of the cases showing positive reaction in all dilutions gave a history of yaws in 1916 with apparent cure.

These experiments were made in July and August, 1925, and it is believed that they are the first to be recorded in which the Kahn precipitation test was used with sera from cases of yaws. The reaction of the Kahn test to yaw sera is what was expected.

Reacting units were not titrated.

NOTES AND COMMENTS

COMMENDATION FOR ARTICLES IN THE BULLETIN

As is stated in the preface, the Surgeon General sends letters of commendation to the authors of articles which are published in the **BULLETIN** and are considered especially meritorious by a board appointed annually to select them.

The titles of such articles, together with the names of their authors and the dates of their publication, which appeared in the **BULLETIN** during the calendar year 1925, follow:

GAS POISONING FOLLOWING POWDER EXPLOSIONS, by D. C. Walton, lieutenant commander, Medical Corps, United States Navy, March, 1925.

What is a NORMAL HEART? THE POINT OF VIEW OF A MEDICAL EXAMINER, by F. K. Soukup, lieutenant (junior grade), Medical Corps, United States Navy, July, 1925.

REPORT OF LEAD POISONING AMONG OXYACETYLENE WELDERS IN THE SCRAPPING OF NAVAL VESSELS, by E. W. Brown, lieutenant commander, Medical Corps, United States Navy, September-October, 1925.

COMBINED METHODS OF TREATING MALIGNANT DISEASE, by L. W. Johnson, lieutenant commander, Medical Corps, United States Navy, September-October, 1925.

THE VITAL-CAPACITY TEST, by David Ferguson, lieutenant, Medical Corps, United States Navy, November, 1925.

A TWO YEARS' STUDY OF DYSENTERY IN HAITI, by P. F. Dickens, Medical Corps, United States Navy, December, 1925.

TREATMENT OF BURNS

In the December, 1925, number of the **BULLETIN**, there was published an abstract of an article by Edward C. Davidson which described his experience with burns treated with tannic acid. In his article Davidson gave several reasons why he preferred the treatment to the older methods. He found that (1) the toxemia was lessened, (2) the mortality was low, (3) the tannic acid had a marked analgesic effect, (4) changing of dressings was done away with,

(5) scar formation was minimized, and (6) infection was less severe.

Davidson also stressed the importance of keeping up the fluid balance of the body by hypodermoclysis, proctoclysis, or intravenous infusions of salt solution in cases of severe burns.

Davidson was a pioneer in the use of tannic acid for burns. Since his article appeared (August, 1925) sufficient time has elapsed for his method of treatment to be tried out thoroughly by others and its value proved or disproved.

In *Annals of Surgery* for July, 1926, there are two very instructive articles dealing with burns and their treatment. The first, "The treatment of cutaneous burns," is by F. W. Bancroft, M. D., and C. S. Rogers, M. D., of New York. The second article, "Burns treated by tannic acid," is by C. S. Beck, M. D., and J. M. Powers, M. D., of Cleveland.

In the first paper the authors call attention to the necessity for combating toxemia by the methods suggested by Davidson and state that the treatment is similar to that of shock, except that it must be continued over a longer period. In their treatment of the local condition, Bancroft and Rogers first attempted débridement and found that marked improvement followed very promptly in numerous cases. However, débridement has obvious disadvantages—for example, it involves a serious surgical risk, the aftertreatment is very painful, and skin grafting must usually be done—so other methods of treatment were sought. Tannic acid was used and found to be the best treatment known at present.

The method of treatment used by Bancroft and Rogers is similar to that used by Davidson.

The skin is first carefully cleansed. A 2½ to 5 per cent aqueous solution of tannic acid is then applied as a wet dressing for 24 hours. When the burned area becomes a mahogany-brown, the dressing is removed and the patient is treated with heated dry air * * *.

In practice patients treated by tannic acid have a firm mahogany membrane in the burned area—healthy skin is apparently unaffected by the treatment. The tanned area has a leathery consistency. Unquestionably there is less pain associated with this method of treatment than with any other procedure we know. We are all used to seeing a patient suffer intensely the first few days after a burn. Blisters that fill and refill after puncture—dressings that have to be changed daily with agony to both patient and surgeon alike. This is entirely changed with tannic acid. The patient is in relative comfort for the first 7 to 10 days and may continue until cured if the burn be merely a first or second degree. The membrane should be left to separate of itself—epithelization occurs beneath it in superficial burns; often attempts at early separation cause bleeding and with bleeding comes infection.

The series of cases treated by these authors was rather small. Their results with tannic acid, however, have been such as to lead them to the following conclusions:

1. The use of tannic acid is a distinct advance in the treatment of cutaneous burns.
2. The systematic treatment of fluid depletion is of great value.
3. Patients with third-degree burns often have late elevation of temperature and exhibit signs of infection. Life may be prolonged in these cases by removing the tanned membrane and treating infection.
4. Skin grafts should be applied soon after sloughs separate.
5. In children with circular burns of the extremities, caution should be exercised in attempting to correct deformities.
6. In deep burns of small surface area immediate débridement, associated with skin grafting, may be of value.

Beck and Powers, in their paper, report additional cases treated by tannic acid and suggest a slight modification of Davidson's method of applying it. Realizing that coagulation of the burned tissue should be brought about as quickly as possible, they spray the tannic acid upon the burned area by means of an atomizer instead of using wet dressings. " * * * The burn is covered with a fine spray every half hour until the surface becomes brown or black. Blebs are opened as soon as they form and the epidermis is removed wherever it separates. The burn is exposed continuously to dry heat. Exposure to air seems to facilitate the process of tanning and exposure to heat hastens drying of the coagulum. An extensive burn can be coagulated completely in 16 hours. A smooth, indurated surface is produced which is entirely insensitive. If tannic acid be applied by compresses, the coagulum sometimes adheres to the compress which, when removed, leaves a raw surface. The spray is an improvement in the method of applying the solution. Ointments containing tannic acid were of relatively little value. If the burn involve the eyes, lips, nose, and ears, these parts can be treated readily by a fine spray of the solution. The coagulum should be dried as early as possible. If the burn involve the subcutaneous tissues, several days may elapse before the surface becomes dry. We have found that the ordinary electric heater facilitates drying."

In the opinion of these writers the time for the removal of the coagulum depends upon the severity and extent of the burn. If only the epidermis is involved, the new epidermis will grow beneath the crust, which will separate at its margin as this occurs. The crust acts as a protective covering and as a splint (similar to ambrine). It may be advisable in deep burns to remove the crust after two weeks and skin graft. Gathering of pus beneath the crust may necessitate its early removal.

Beck and Powers found the use of tannic acid in the treatment of burns to possess the same advantages found by Davidson, and Bancroft, and Rogers. Expressed in their words, these are: "1, the control of toxicity; 2, the simplicity of method; and 3, the comfort of the patient."

The partial prevention of toxemia is explained as due to two factors: (1) precipitation of the protein and drying of the coagulum; (2) the covering afforded by the crust prevents loss of fluid.

The writers conclude their paper with the paragraph which follows: It will be well for naval medical officers to bear its contents in mind and to carry out its suggestions in their cases of burn.

The treatment of burns by tannic acid should be popularized. The solution can be made by the laity by mixing four teaspoonfuls of the dry power in a glass of water. This will make approximately a 2½ per cent solution. Tannic acid is easily procured and can be kept indefinitely as a powder. It should form an important adjunct to the equipment of first-aid stations of steel mills, mines, factories, etc., so that immediate application, either by means of compresses or the spray, could be carried out.

PARASITIC INFECTIONS IN CHINA

China, a country of much interest to all medical men, and particularly to the naval medical officer, is a natural laboratory for the study of parasitic infections and human disease. Recently Ernest Carroll Faust, Ph. D., of the Peking Union Medical College, has reviewed the more important investigations in parasitology that have been carried on in China in the past few years, and has published the results of his study in the Archives of Pathology and Laboratory Medicine for August, 1926. Because of the intimate contact of many naval medical officers with China, it is thought that a brief abstract of his paper will be of value.

Faust deals with (1) the distribution of parasitic diseases in China and (2) the biologic, epidemiologic, and pathologic aspects of the most important disease-producing organisms of the area. He calls attention to the necessity of a knowledge of the physiographic features of the country, of the rainfall and climate, to an understanding of the distribution of parasitic infections in China. Also it is necessary to know the habits and customs of the Chinese people. These are too well known to naval medical officers to require repetition, but it should be remembered that China has two distinct climates—one north of the Yangtze and another south.

Many of the parasitic infections peculiar to the Orient are the result of the food habits of the people. Animal and plant foods strange to the western world, contaminated by night soil and eaten raw, play a large part in the spread of infection.

In China there are eight or more species of trematodes or flukes parasitic in man. Each requires a special type of snail as an intermediate host. Domestic and wild animals harbor the parasites in some cases. In others, for example, oriental schistosomiasis, man is the only important host.

Many investigations have been carried on in recent years in northern, central, and southern China, but western China still remains to be studied.

Faust divides the animal parasites of China into those of major importance and those of minor concern. The protozoan diseases of major importance are malaria, amebiasis, and kala-azar. The helminthic infections of importance are oriental schistosomiasis, clonorchiasis, fasciolopsiasis, hookworm infection, and filariasis.

Malaria.—Found throughout China, as far north as Peking, as far west as Szechuan. Most severe in the south and progressively less so toward the north. Hainan and Formosa, off the coast, are important endemic areas. All three species are found. The subtertian appears more common in the south; the quartan in the Yangtze Valley. The travel of merchants, soldiers, and students has spread the infection from one area to another. In north China, *Anopheles maculipennis* is the common mosquito concerned in transmitting the disease. In south and central China, *A. sinensis*, *A. ludlowi*, and *A. maculatus* are involved. Blackwater fever is unknown in China except in Yunnan.

Amebiasis.—Occurs throughout China, but incidence varies considerably in different parts. In Wuchang (central Yangtze Valley) in 1921, Faust and Wassel found 50.9 per cent of persons in hospitals positive for the dysentery ameba, 15.9 per cent having dysentery. At Kuling, a healthy group of Chinese showed 10.8 per cent infection (cysts only), while a foreign group had an incidence of 21.4 per cent amebic colitis. Investigation by Faust has shown that among the Chinese more acute amebic infection is found in the south and more carriers in the north. Among foreign residents the incidence of acute and chronic amebiasis is greater than in the native population.

Yatren has been found effective in clearing up chronic cases and carriers, but emetin remains the drug of choice in acute cases.

Kala-azar.—Important disease in parts of north China. Is confined to territory north of the Yangtze Valley. Young and Vant Sant (1923) showed that cultures of peripheral blood, or even smears, may be useful in diagnosis, but spleen puncture yields better results. The method by which Leishman-Donovan bodies are transmitted has not been demonstrated. Treatment with antimony has proved satisfactory.

Other protozoan infections reported by Faust as being common in China are: (1) Intestinal flagellates; (2) balantidiosis (not reported from man); (3) relapsing fever (central and north China, Manchuria, western China. Delousing has eliminated 95 per cent of the infection where used); (4) bronchial spirochete.

Among the metazoan diseases discussed are:

Schistosomiasis japonica.—Discovered in China by Logan in 1905. Found throughout the Yangtze Valley. Also in areas along the coast as far south as Hongkong, and above Canton in the North River country. Recently has been found in Yunnan. In the Yangtze Valley the host is *Oncomelania hupensis*, a small amphibious snail, which lives along the banks of small streams and avoids large bodies of water. In the coastal mountain streams the host is a closely related snail. In China man is the only important definitive host. Among the symptoms of the disease are, usually, an urticarial rash, followed by eosinophilia and increased blood serum globulin. The worms are in the hepatic portal vessels. These worms and their eggs reach the portal capillaries and enter the liver tissue and intestinal wall, causing dysentery, thickening of the wall, and hepatic cirrhosis, with ascites. Antimony treatment is effective, but care must be exercised in advanced cases. Sterilization of night soil is the only means by which the disease can be eradicated.

Clonorchiasis.—Contracted through eating raw fish. Human infection is confined almost entirely to Kwangtung Province. The first intermediate host is a snail. Later, fresh-water fishes become the host. From these the worm passes to man. The parasite lives in the bile ducts and bile capillaries. Mild infections are almost symptomless. In severe infections cirrhosis of the liver, with ascites, is common. In experimental animals the oral administration of gentian violet has been found effective. The thorough cooking of all fresh-water fish is essential for prevention.

Paragonimiasis.—Common in Korea and Formosa, it also has been reported from Fukien and the Yangtze Delta.

Other flukes of minor importance are: *Opisthorchis felineus*, *Metorchis* sp., *Metagonimus yokogawi*, *Heterophyes*, and others, most of which are not parasitic in man.

Fasciolopsiasis.—Due to presence of *Fasciolopsis buski* in the small intestine. Found in man and pigs in central and south China and in Formosa. Areas of heavy human infection are in northern Chekiang Province and in Kwangtung. Barlow, in 1925, worked out the life cycle of the fluke in Chekiang where, he states, between a million and a million and a half persons are affected. The snails, *Planorbis schmackeri* and *Segmentina nitidellus*, are the first intermediate hosts. Man acquires infection through eating raw water chestnuts and the water caltrop, on which the flukes have become encysted. Symptoms are fullness of abdomen, constipation, dyspepsia, edema, and anemia. Beta naphthol and carbon tetrachloride are specifics. Immersing the bulbs in boiling water for a few seconds will prevent the disease.

Other flukes are important in veterinary medicine, but, as they rarely infect man, will not be enumerated.

Hookworm.—Ancylostomiasis is common in central and south China. In north China infestation with the hookworm is frequently found, but clinical manifestations are rare.

Filariasis.—It was in Amoy that Sir Patrick Manson (1877–1883) demonstrated nocturnal periodicity of the larvae of *Filaria bancrofti* in man and the metamorphosis of the larvae in the mosquito. Filariasis is found along the coast from Tonkin to Shantung, and up the Yangtze to Ichang. Little attention has been paid to it.

Ascariasis.—Found all over China in large numbers. Oil of chenopodium or santonin is the usual treatment. It is routine that, except in emergencies, all patients requiring abdominal operations shall first be freed of ascaris. Sterilization of fruit and vegetables by boiling water will prevent infestation.

Tapeworm infections.—*Taenia saginata* is fairly common in north China. *Taenia solium* occurs endemically in central and north China. *Echinococcus* is found in Mongolia. Other tapeworms have been found in man in China, but are not important.

Faust divides the Sino-Japanese areas into five faunistic divisions: (1) Tropical oriental, (2) subtropical oriental, (3) intermediate, (4) palearctic, and (5) dry palearctic. Each of these divisions has its own dominant parasitic diseases, which have been mentioned. This division has been found of value at the Peking Union Medical College Hospital, as, in cases in which residence is not known, the presence of certain parasites will frequently fix the locality from which the patient comes.

Medical officers on duty in Chinese waters should appreciate such a survey as this reported by Faust, as it enables them to be on their guard against the various parasites found in the locality in which they may be at the time and by the adoption of simple measures to prevent, to a large extent, the introduction of disease among the naval personnel intrusted to their medical care.

EFFECT OF ELEVATION OF TEMPERATURE ON SPIROCHETES

The September, 1926, number of Archives of Dermatology and Syphilology contains an account of "Studies of the therapeutic effect of fever in experimental syphilis," by Jay Frank Schamberg and Anna M. Rule, of Philadelphia.

The writers, in an attempt to shed light on the therapeutic action of malarial inoculation in syphilis, conducted certain experiments on rabbits. First, rabbits were inoculated intratesticularly with an active testicular suspension from previously syphilized rabbits on

one side, and with 1 cubic centimeter of freshly drawn malarial blood, containing plasmodia, on the other. The rabbits developed syphilis as usual.

The next experiment was conducted with the view of determining the effect of elevation of body temperature upon the development of syphilis in the inoculated rabbits. Inoculations of an emulsion showing numerous motile spirochetes were made intratesticularly in eight rabbits. Three days after the inoculation three of the rabbits were given a hot bath at 113° F. for from 15 to 20 minutes. This bath was repeated every day for 11 days. Rabbit temperatures normally vary from 101° to 103° F. After the bath, the temperatures rose to from 105° to 110° F. Three other rabbits were given injections of Coley's toxin fluid in daily ascending doses. The rise of temperature was irregular and averaged 1.5° F. as compared with an average rise of 4° F. as a result of the baths.

The other two rabbits were not treated but were used as controls. Both of these developed palpable syphiloma in the testicle on the eighteenth day. Two of the rabbits which received Coley's fluid developed syphilis and one remained free. Of the rabbits receiving the hot baths, all have remained free from syphilis.

Because the results were so astonishing, Schamberg and Rule repeated the hot-bath experiments. Seven more rabbits were inoculated with syphilis as before. Three were kept as controls and four were subjected to hot baths, beginning four days after inoculation. The untreated controls all developed syphilis while all of those given the baths remained free.

Later experiments were made to determine the number of baths necessary to prevent the development of syphilis. Four rabbits, four days after inoculation, were given a single bath; two were given two baths; two, three baths; two, five baths; two, seven baths; and two, nine baths. All, except one rabbit which had only one bath, remained free from syphilis for a period of 49 days. Later, three other rabbits showed evidence of syphilis.

The authors, being satisfied that elevation of the body temperature of the rabbit interferes with or prevents syphilitic infection, wished to determine if this interference was due to the direct or the indirect elevation of temperature. To do this, they carried out the following experiment:

"Cut-up suspension of syphilitic testicle diluted with a little normal saline solution was heated in a test tube on a water bath at 40° C. (104° F.) for varying periods and then injected into the testicles of rabbits.

"Injections were made into two rabbits after 30 minutes' heating and into two each at the end of one and two hours, respectively. Three control rabbits were inoculated with an unheated suspension.

"Examination under the dark field before each inoculation demonstrated abundant very motile spirochetes.

"The controls developed a syphiloma with spirochetes within the usual period.

"All of the animals receiving injections with heated suspension have remained free from syphilis up to the present date, a period of 76 days. Unfortunately, the two animals receiving injections with the 30-minute heated emulsion died—one from traumatism and one from an unknown cause. The inguinal glands have been removed from four of these rabbits and inoculated into others which are now under observation.

"In view of the unimpaired motility of the spirochetes after the heating described, we apprehended that the heating was not continued long enough and that syphilis would develop. We therefore immediately inaugurated another experiment as follows: Testicular suspension was heated at 41° C. (105.8° F.) for three, four, five, and five and three-fourths hours, and each heated specimen was injected into two rabbits. It was observed by dark-field examination that at four hours the spirochetes became less motile and that at five and three-fourth hours motility had almost ceased and that the spirochetes began to break up and become shorter. None of these rabbits developed any evidence of syphilis."

These experiments seem to show that *spirochæta pallida* is biologically damaged at a temperature much lower than that necessary to kill vegetable organisms. The spirochetes in the testicular suspension heated on the water bath were so affected that they were unable to produce infection.

The writers call attention to the fact that their experiments were conducted with rabbits in which syphilis had been recently induced. Therefore, they can not say the results could be duplicated in humans. However, as it is possible, and quite harmless, to cause a rise of temperature of 4° F. and to maintain it for a period of 20 minutes, it will be comparatively easy to carry out the necessary experimental work with humans.

An interesting question is a result of these experiments: "Will extremely hot baths serve as a prophylactic measure after exposure?"

The conclusions reached by Schamberg and Rule are as follows:

"1. It is possible to prevent syphilitic infection in rabbits after testicular implantation of the specific virus if the rabbits are given a series of baths at a temperature of 45° C (113° F.) within three to four days after inoculation. An average rise of temperature of 4° F. is induced.

"2. How many baths are necessary to sterilize the infection is not yet definitely known but at the date of this communication it would appear that about nine are necessary.

"3. Infection can also be prevented by heating the spirochetic suspension on a water bath at 40° C. (104° F.) for one hour before inoculation.

"4. It would appear that the thermal death point outside the body of *Spirochæta pallida* is about 41° C. (105.8° F.) with an exposure of approximately six hours.

"5. While these experiments indicate that *Spirochæta pallida* in the rabbit can not withstand high fever, it is not definitely proved that this applies to human syphilis.

"6. Whether these experiments shed any illumination on the mode of action of malaria in syphilis can only be determined by further investigation."

RABIES

In the BULLETIN for July, 1926, there appeared an interesting paper by Lieut. J. B. Logue and Lieut. (J. G.) O. B. Morrison, of the Medical Corps, United States Navy, on Rabies. In discussing the animal experimentation carried out by them they pointed out that they were unable to find Negri bodies in the brains of rabbits inoculated with an emulsion of brain tissue from a dog which unquestionably had suffered from rabies and in whose brain tissue the bodies had been found, although the rabbits developed typical rabies and died as a result. Nor were they able to find Negri bodies in the brains of two other rabbits which had been inoculated with an emulsion of brain tissue from the rabbits which had been inoculated with the emulsion of dog's brain. That their findings are not unusual and the reason therefor are suggested in a personal communication from Dr. R. B. H. Gradwohl, lieutenant commander, Medical Corps, United States Naval Reserve, director of the Pasteur Institute of St. Louis, and in a bulletin on antirabic serum issued by him.

* * * It seems certain that the Negri bodies are definitely diagnostic of rabies, for the reason that in all cases where they are microscopically found animal inoculation later is successful in the reproduction of rabies. Those negative results obtained at times are due to fault in technique, which may be corrected. Again, failure to find Negri bodies is sometimes followed by a successful inoculation experiment with the same material. This may be explained in this way: *Sometimes Negri bodies are so small that they escape detection.* * * * (Italics ours.)

He further remarks:

There is no relationship between the number and size of the bodies and the length of the period of incubation, or stage of the disease. Negri bodies are usually of larger size in the larger animals; for instance, they are larger in dogs than in cats and larger in great Danes or mastiffs than in the smaller varieties of dogs. They are largest in cattle or horses. *In animals inoculated with rabio virus they are quite small.* (Italics ours.)

Rabies, which has been endemic in our Southern States for many years, seems to be on the increase and to be more common in the Northern States than it has been heretofore. It is a disease of such appalling severity when once it has developed that every effort must be made to prevent it. This may be done in several ways:

1. By causing all dogs to be muzzled when at large.
2. By vaccination of dogs after the method of Honda. This has been highly successful where tried on a large scale, but, on account of the large number of dogs in which no one takes a personal interest, is impracticable. It might well be taken advantage of in the case of pet dogs.
3. By educating the public to a knowledge of the dangers of rabies; stressing the fact that no cure exists for the disease once it has developed; and by acquainting the laity with the efficacy, harmlessness, and practical painlessness of the Pasteur treatment, urging all persons who have been bitten by a known or suspected rabid animal to submit to treatment at once.

In combating rabies, preventive medicine reaches one of its highest points of efficiency. It is the duty of the medical profession to acquaint the public with this fact.

AMERICAN RELIEF ADMINISTRATION IN RUSSIA, 1921-1923

The Bulletin of the American Relief Administration, series 2, No. 45, April, 1926, is a report on "American Medical and Sanitary Relief in the Russian Famine, 1921-1923," by Henry Beeuwkes, M. D., medical director, American Relief Administration, Russian unit. It is a most instructive report and describes the situation in Russia during famine times in a very illuminating manner. In addition, it portrays medical and sanitary conditions in the Soviet Republic in their true light. Without being critical, it describes things as they are and shows that Russia has far to go before it reaches even the same stage of sanitation and of advancement in medical science which it had attained before the revolution.

In a foreword the writer cites the causes—revolution, lack of trade, paralysis of industries, worthless currency, destruction of homes, unhygienic existence, and pestilence—which rendered the Russian people entirely unable to cope with the desperate situation which faced them in the spring of 1921, "when complete failure of crops occurred throughout the Volga Basin and in the southern Ukraine and threatened 24,000,000 persons with starvation and those scourges which always keep company with famine."

When conditions were fully realized in this country a "Russian unit" of the relief administration was organized and sent to Russia,

the first members arriving in that country August 27, 1921. At that time the financial resources of the unit consisted of \$9,000,000 for child feeding and \$3,000,000 for medical relief. It was seen at once that these sums would be entirely inadequate if the objects of the mission were to be accomplished, so they were finally increased to almost \$60,000,000 for food relief and \$8,000,000 for medical relief. With this vast sum much was accomplished, but, in spite of all relief measures taken, suffering and deaths from starvation and disease were enormous.

The report gives a very interesting historical account of medical practice in Russia from the reign of Boris Godunov (1598-1605), when it was first encouraged; through the reigns of Peter the Great and Catherine the Great, under whom much progress was made—Catherine having introduced the Teutonic influence; through the time of the Romanoffs, under whom it reached its highest state; to the present time, when, under the influence of the communists, who have attempted to make physicians of the uneducated working classes, it has fallen into an unenviable situation.

According to the report, most of those who study medicine to-day—it must be remembered that “to-day” refers to 1923—begin their studies at the age of 16 or 17 and with entirely inadequate preliminary education. A serious shortage of physicians exists, but many of those who have embarked upon the practice of medicine have been forced to give it up in order to pursue some more remunerative occupation, and many of the medical institutions have been able to keep their doors open only because of the assistance given them by the American Relief Administration.

Sanitation, which had never reached a very high degree of perfection in Russia, was at a very low ebb when the relief administration started its work in 1921, because of the congestion and poor physical condition of buildings, plumbing, and heating plants, and the extreme shortage of fuel and clothing. Many of the hospitals and dispensaries had been closed because no fuel could be obtained to heat the buildings or to operate the necessary sterilizers. Patients in the hospital which had been able to remain open were in a deplorable condition because of lack of dressings, clothing, bedding, and water for bathing. Many were extremely filthy and vermin were rampant. The doctors and nurses themselves were on the verge of starvation and could scarcely be blamed for their apparent lack of enthusiasm for their work.

Care of the homeless and destitute children presented the greatest problem of all. Prior to the arrival of the relief administration these had been gathered by the thousands into temporary and permanent “homes” where, because of filth, cold, lack of food, and overcrowding, many had died miserably.

Carrying into practice the adage "He who eats must work," the Government, prior to 1921, had prohibited all trading in foodstuffs and forced the "workers" to subsist on an official ration, called a "paiok," which, itself entirely inadequate to support life in any degree of comfort, was frequently not forthcoming. For much of the time professional men had nothing to eat but black bread, frozen potatoes, and, rarely, a little cabbage or fish.

The task confronting the relief workers was a stupendous one, as is shown by the figures of the Soviet Government itself, compiled in the spring of 1922. In the Volga Provinces, with a total population of 32,691,000, the "starving" numbered 20,215,000. Of these, 11,109,000 were adults and 9,106,000 were children. In the famine sections of the Ukraine there were 9,655,000 persons, of whom 3,680,000 were classified as "starving." When it is known that the American Relief Administration furnished food to a maximum of 10,000,000 people daily, it is easy to realize that the number of lives saved by this agency must have been enormous.

As the supply of food became exhausted the peasants resorted to all sorts of substitutes—weeds, ground bones, and clay among them—and proved instances of cannibalism were not rare. A great proportion of the cases of cannibalism are accounted for in the report as being due to an abnormal mental condition induced by the cachexia associated with "deficiency diseases."

The illustrations given in the report show even more vividly than the text the conditions that existed in the children's homes, hospitals, and refugee trains and camps.

The refugee movements were poorly controlled by the Government and conditions among the refugees were horrible in the extreme. The writer of the report states that he saw one refugee train in which all the children in several cars were found to be frozen upon their arrival in Moscow.

In the evacuation stations, where refugees gathered awaiting authority for and means of getting out of Russia, it is estimated that 80 per cent developed typhus and that 30 per cent died. Needless to say these refugees spread typhus wherever they went, chiefly to Poland, where large epidemics arose.

According to the report a conservative estimate of the number of cases of typhus occurring throughout Russia from 1918 to 1922 would be 30,000,000.

Owing to the fuel and water shortage and the lack of effective cooperation on the part of the Government, the American Relief Administration was forced to adopt methods of delousing and disinfection which did not require fuel. Sulphur was used on an enormous scale and other disinfectants freely. Soap was imported and distributed by the American Relief Administration, more

than 2,500,000 pounds being used. These measures were very effective where used and reduced the incidence of typhus among the children under the care of the American Relief Administration very materially.

Interesting medical notes concerning the various epidemic diseases are given but are too voluminous to allow quoting here. It is sufficient to note that combined infections and surgical and nervous complications were not rare. It was not unusual to see patients suffering with two or three of the diseases simultaneously. Cases occurred in which typhus and relapsing fever were combined with the dry form of diphtheria and advanced scurvy. Typhus and cholera and typhus and smallpox were seen in combination.

In addition to typhus and relapsing fever, malaria, tuberculosis, trachoma, plague, pellagra and the other deficiency diseases—scurvy and rickets—brought many problems to the relief administration which required solution. Emaciation and hunger edema were, of course, everywhere.

As the resources of the American Relief Administration would not permit it to feed the entire child population of the famine districts, some method of selection was necessarily adopted. Different localities offered different problems. In the rural districts practically all children were given a ration. Where needs were not so great a village committee selected those to be fed. In the large cities the problem was more difficult. It was found that selection on the basis of the Pelidisi system alone would not be equitable, as children with a sitting height of less than 50 centimeters give a higher Pelidisi than do children with a sitting height above 50 in the same state of nourishment. Consequently, it was necessary to supplement the Pelidisi measurements by a complete physical examination, the findings of which were, for convenience, expressed in the Sacratama formula.

The general improvement following the feeding by the American Relief Administration was most satisfactory. At the time the feeding was begun, 70 per cent showed anemia. Three months later only 33 per cent were anemic. Fat and general improvement increased in about the same proportions.

One of the great difficulties met with upon the arrival of the unit in Russia was the entire lack of reliable information concerning matters medical and epidemiological. Such statistics as existed were unreliable and misleading, having been gathered by politicians without scientific training. It was not until the relief administration itself had investigated conditions and had trained intelligent and trustworthy helpers to gather statistics that the true state of affairs was appreciated. This, of course, necessitated delay in inaugurating

relief measures on a large scale. Delay in shipment of supplies both in the United States and Russia further operated to prevent full relief from being given promptly, although, thanks to a donation of medical supplies from the American Red Cross stocks in Paris, the administration was able to begin work on a small scale with little delay.

The relations of the commissar of public health with the medical relief units of the administration were cordial. In the districts, however, there was considerable interference by the local authorities with the orderly and systematic distribution of medical supplies. In some cases this was carried so far that the administration found it necessary to limit the relief measures in the districts affected.

In discussing the plan and scope of medical relief, the report says:

The situation to be met was briefly as follows: Epidemics of great magnitude reigned throughout Russia, while facilities for combating the same were extremely limited and medical institutions, though present in large numbers and generally well administered, were unable to function effectively due to shortage of all classes of medical supplies and lack of food for patients and personnel. Our aim accordingly became to employ all of our resources in improving sanitary conditions, reducing disease, and relieving the poverty of medical institutions.

As has already been mentioned, it was found impracticable to conduct extensive delousing operations with steam, because of the shortage of fuel and water and the lack of governmental cooperation. A small number of steam disinfectors were used, but chief reliance was necessarily placed in soap, sulphur, and other disinfectants, together with "mass inoculation" which could be carried out without local assistance.

The following program was adopted and carried out in all districts:

1. The supply of existing hospitals, dispensaries, feldsher points, laboratories, and other sanitary formations with all essentials necessary to carry out effective work.
2. The organization and administration of ambulatories and pharmacies where needed.
3. Assistance to homes for children, the aged, blind, etc.
4. Issue of food for hospital patients and inmates of homes.
5. Measure to reduce disease and improve sanitary conditions: Inoculation campaign, clean-up campaign, supply of disinfectants and disinfecting apparatus, improvement of water supply of cities, and bathing campaigns.
6. Food and clothing relief for medical personnel.
7. Supply of medical literature to universities and other institutions.

The headquarters of the medical director were established in Moscow and from this point the administrative work was carried out. Each district had one American doctor—the district physician—in charge, who directed all local medical relief and initiated all meas-

ures for improvement of sanitary conditions in his area. His principal duty was to supply the medical institutions.

The number of American medical personnel employed in Russia during the operation of the relief was 47, made up of 30 doctors, 15 medical-property men, and 2 stenographers; while a total of 737 Russian employees was regularly required, a much larger number being employed for special work as the occasion demanded.

The account of the administrative work done, the procurement and distribution of supplies, the system of accounting, and the accounts of the work done in the individual districts form a record of service well performed and will be a valuable guide to anyone engaged in such work in the future.

The inoculation campaign was carried out on a large scale and was very effective. As "food relief" was made conditional upon vaccination and inoculation, little opposition was encountered.

In addition to vaccination against smallpox, a tetra-vaccine containing the following organisms per cubic centimeter was given:

Cholera	4, 000, 000, 000
Typhoid.....	1, 800, 000, 000
Paratyphoid A.....	1, 250, 000, 000
Paratyphoid B.....	1, 250, 000, 000

Adults were given an injection of 1 cubic centimeter, and a week or 10 days later an injection double this amount.

During the active campaign, 1,590,136 persons were vaccinated against smallpox, and 3,271,024 received full courses of the tetra-vaccine. These figures do not include the large numbers who were vaccinated before and after the intensive campaign which was conducted during the spring and summer of 1922.

With the arrival of the 1922 harvest, the necessity for food relief came to an end, but, because of the effects of undernourishment and the ills that follow in its wake, it was necessary to continue medical relief work until July, 1923, when the last American physicians left for home leaving behind them a splendid record of disinterested service which can not but have its moral, as well as physical, effect upon the millions of young Russians who benefited by it.

FORECASTING SMALLPOX EPIDEMICS IN INDIA

The influence of climate upon disease prevalence and severity has been a subject of study for many years. Weather conditions have been cited as having a bearing upon epidemics from early days. Thorough, careful study of weather conditions in relation to disease has not been so common, however. Such a study into the relationship between climate and smallpox in India has recently been made

by Sir Leonard Rogers, and a report thereof has been made to the Medical Research Council. It has been published by His Majesty's Stationery Office, London, as Special Report Series, No. 106. The entire report might be read with profit, but the conclusions reached by the investigator are of special interest and are quoted in full:

1. The smallpox incidence in India is greatest and most uniform from year to year in Madras, the only Province not receiving much rain during the southwest monsoon months from June to October.

2. In all the seven Provinces receiving the southwest monsoon rains there is a remarkable decline of smallpox every year at that season, followed by an increase during the ensuing cold and hot dry seasons once more checked by the next monsoon. In Madras there is no decline of the disease at that season in the absence of the southwest monsoon, and only a very slight fall after the October rains, while the main smallpox rise occurs after the heavy rains of November and December. The rainfall of all three months is derived from the northwest autumn monsoon. Rainfall alone will not, therefore, explain the great fall of smallpox in the rest of India during the southwest monsoon.

3. The greatest smallpox epidemics occur in the low-rainfall areas of northwest India and the central India and Deccan Plateau, while they are least marked in humid Bengal with consistently high rainfall; the epidemics in the former areas nearly invariably follow a greater or less failure of the southwest monsoon rains, accompanied by comparatively low humidity.

4. The provincial average smallpox incidence shows no relation to the monthly temperature and none to the relative humidity in the damp areas of lower Bengal, Assam, and Madras. The absolute humidity (that is, the amount of aqueous vapor as measured by its pressure, a convenient measure of combined humidity and temperature), shows a close relation to smallpox prevalence. It rises to its maximum with the annual decline of smallpox during the southwest monsoon in every province receiving its main rain then. In Madras both the absolute humidity and the smallpox rate are stationary at that season in the absence of the southwest monsoon, while the maximum absolute humidity occurs as early as April and May and is accompanied by the annual moderate early decline of smallpox. The early winter northeast monsoon rains occur during a fall of the mean monthly temperature and of the absolute humidity, thus explaining their failure to prevent the winter increase of smallpox in Madras. The influence of high absolute humidity in checking smallpox thus suffices to explain its seasonal prevalence in all parts of India with their varying rainfalls and temperatures.

5. The map shows increased smallpox with decreased rainfall and absolute humidity in northern India from Bengal to the northwest frontier province; it is especially noteworthy that in the latter area alone is the absolute humidity during the southwest monsoon as low as in Madras, as this is the only climatic feature common to these two distant parts of India, and that the smallpox rate is nearly as high.

6. Records of smallpox case incidence in Indian jails for 30 years—the data of which are recorded in areas selected for their meteorological conditions—show a very close relationship between high annual humidity and low smallpox incidence, and vice versa, in the whole of northern and central India, once more confirming the influence of humidity.

7. The effect on the yearly variations of smallpox mortality of meteorological conditions has been studied from monthly charts of the rainfall for 48 years, and of the absolute humidity for the 30 years, for which they are available for eight provinces of India, and also the yearly smallpox rates and abso-

lute humidities during the monsoon and autumn for 30 years, with the result of showing that in the less rainy areas of the northwest and central India, with average absolute humidity during the monsoon of about 0.700-0.800, low absolute humidity during that period is nearly always followed by excess of smallpox in the ensuing dry seasons; while in the areas with heavy rainfall of Bengal and Assam, as well as in Madras, the absolute humidity during the summer, which is very high, reaching 0.800-0.970, has very little relation to smallpox incidence, but years in which the humidity is low in the autumn, when normally it ranges from about 0.700 to 0.800, are generally followed by excess of smallpox in the ensuing dry months. The only exceptions are that low humidity soon after a smallpox epidemic, which has exhausted most of the susceptible material, may not result in any increase of the disease; while five or six consecutive years of normal or high absolute humidity may be followed by a rise of smallpox, on account of the accumulation of susceptible persons.

8. By watching the absolute humidity in India, and possibly in other tropical continental countries, at the season when they normally average about 0.700-0.800, about four-fifths of smallpox epidemics may be foreseen two or three months ahead, in time to enable the public health authorities to issue warnings and to organize additional vaccination staff to cope with and minimize the approaching outbreak of smallpox.

HELIUM-OXYGEN MIXTURE IN DIVING

The use of helium gas in deep-sea diving has been a study of the bureau for some time past. As is well known, the danger in diving operations arises when the diver is brought to the surface. If he has been subjected to high pressure over a considerable length of time, nitrogen has become dissolved in his blood to a degree that renders it dangerous to release the pressure suddenly, as the nitrogen in escaping from the blood will, under these circumstances, form bubbles and lead to the development of bends, or caisson disease.

Sayers and Yant, of the United States Bureau of Mines, have recently carried out some experiments with white rats and guinea pigs, in which these animals were subjected to high pressures (10 atmospheres) while breathing air in which the nitrogen has been replaced by helium. Helium is an inert gas and produces no harmful effect. It is very slightly soluble and easily diffusible. Sayers and Yant found that the helium-oxygen mixture can be breathed by men without discomfort. Guinea pigs and white rats, they found, could be safely decompressed in one-third to one-quarter the time required when nitrogen-oxygen mixture (air) was used. Theoretically, therefore, the helium-oxygen mixture should enable diving operations to be carried on safely at deeper levels and for a longer time than has been possible with ordinary air. Also the mixture should be valuable for use as a wash gas in the decompression chamber. Further study must be made before the practical value of this procedure can be determined, but so far results have been very encouraging.

TREATMENT OF PERNICIOUS ANEMIA BY DIET

Cabot's case records, as they appear in the Boston Medical and Surgical Journal, give in great detail the clinical and pathological findings in many interesting cases. In the issue of that journal for August 26, 1926, the case of a patient suffering from pernicious anemia is discussed. Much of interest was brought out by Dr. George R. Minot in the discussion of the physical examination, but of especial interest and value are the notes concerning the treatment by a special diet devised by Dr. William P. Murphy and Doctor Minot.

The diet, described in the same number of the Boston Medical and Surgical Journal, " * * * is one composed of foods rich in complete proteins, particularly liver, contains an abundance of muscle meat, fruits, and green vegetables, and is low in fat."

Doctor Minot, in his discussion, pointed out that much study is yet required before the true value of the diet in pernicious anemia can be determined. It must be learned whether or not there is some sort of food deficiency concerned in the production of the disease. Doctor Minot is convinced that "the ingestion of large amounts of cooked liver (preferably calves') or kidneys (preferably lambs') is of distinct importance."

The rather prompt and continued rapid increase of the numbers of this patient's red-blood corpuscles per cubic millimeter of blood to greater numbers than are usually observed in remissions of pernicious anemia is entirely similar to what has been shown by other patients who have taken this diet. * * *

It is too early to predict how much lasting benefit will follow the use of this diet in pernicious anemia, but, in Doctor Minot's experience, the patients who have used it have responded promptly with marked increase in the number of red-blood cells—on the average, from 1,500,000 per cubic millimeter to 4,000,000 per cubic millimeter in about 10 weeks—and have enjoyed much better health, for at least some months, than have patients treated by other means.

The diet should be continued even after the red-blood cell count has become high.

STATEMENT OF THE FACTS AND OPINIONS AGREED TO BY THE INTERNATIONAL MEETING ON CANCER CONTROL HELD AT LAKE MOHONK, N. Y., SEPTEMBER 20-24, 1926

Although the present state of knowledge of cancer is not sufficient to permit of the formulation of such procedures for the suppression of this malady as have been successfully employed for the control of infectious diseases, there is enough well-established fact and

sound working opinion concerning the prevention, diagnosis, and treatment of cancer to save many lives, if this information is carried properly into effect.

1. The causation of cancer is not completely understood, but it may be accepted that for all practical purposes cancer is not to be looked upon as contagious or infectious.

2. Cancer itself is not hereditary, although a certain predisposition or susceptibility to cancer is apparently transmissible through inheritance. This does not signify that, because one's parent or parents or other members of the family have suffered from cancer, cancer will necessarily appear in other persons of the same or succeeding generation.

3. The control of cancer, so far as this subject can be understood at the present time, depends upon the employment of measures of personal hygiene and certain preventive and curative measures, the success of which depends upon the intelligent cooperation of the patient and physician.

4. Persons who have cancer must apply to competent physicians at a sufficiently early stage in the disease in order to have a fair chance of cure. This applies to all forms of cancer. In some forms early treatment affords the only possibility of cure.

5. Cancer in some parts of the body can be discovered in a very early stage, and if these cases are treated properly the prospect for a permanent cure is good.

6. The cure of cancer depends upon discovering the growth before it has done irreparable injury to a vital part of the body and before it has spread to other parts. Therefore efforts should be made to improve the methods of diagnosis in these various locations and the treatment of the cancers so discovered.

7. The public must be taught the earliest danger signals of cancer, which can be recognized by persons without a special knowledge of the subject, and induced to seek competent medical attention when any of these indications are believed to be present.

8. Practitioners of medicine must keep abreast of the latest advances in the knowledge of cancer in order to diagnose as many as possible of the cases of cancer which come to them.

9. Surgeons and radiologists must make constant progress in the refined methods of technic which are necessary for the diagnosis and proper treatment not only of ordinary cases but of the more obscure and difficult ones.

10. There is much that medical men can do in the prevention of cancer, in the detection of early cases, in the referring of patients to institutions and physicians who can make the proper diagnosis and apply proper treatment when the physicians themselves are unable to accomplish these results. The more efficient the family

doctor is the more ready he is to share responsibility with a specialist.

11. Dentists can help in the control of cancer by informing themselves about the advances in the knowledge of the causes of cancer, especially with relation to the irritations produced by imperfect teeth and improperly fitting dental plates. They can also help by referring cases of cancer which they discover to physicians skilled in the treatment of cancer in this location. It may be doubted whether all dentists fully realize the help which can be obtained from X-ray photographs in revealing not only the state of the teeth but the condition of the bone surrounding them.

12. Medical students should be instructed in cancer by the aid of actual demonstrations of cancer patients, and this to a sufficient extent to give them a good working knowledge of the subject.

13. The most reliable forms of treatment, and, in fact, the only ones thus far justified by experience and observation, depend upon surgery, radium, and X rays.

14. Emphasis should be placed upon the value of the dissemination of the definite, useful, and practical knowledge about cancer, and this knowledge should not be confused nor hidden by what is merely theoretical and experimental.

15. Efforts toward the control of cancer should be made in two principal directions: (1) The promotion of research in order to increase the existing knowledge of the subject, and (2) the practical employment of the information which is at hand. Even with our present knowledge many lives could be saved which are sacrificed by unnecessary delay.

AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons each year heretofore has generously invited the Surgeon General to nominate a specified number of medical officers as candidates for fellowship in the college.

Assuming that the privilege will be extended to the Navy again this coming year, it is suggested that officers desiring to have their names considered for nomination submit their applications not later than July 1, 1927.

Although, for officers of the Navy, fellowship is made a matter of courtesy, it nevertheless seems proper that there should be presented as candidates only those officers who are fully qualified for fellowship in accordance with the standards set by the college. Consequently it is the fixed policy of the bureau to stand sponsor for only those officers who, in the opinion of the bureau, meet the high standard of professional qualifications set by the college, and who are prepared

to comply with all the professional requirements imposed by the college on candidates from civil life. Should the number of qualified applicants exceed the number of nominees permitted, the order of selection will be according to relative merit.

To be eligible for fellowship without technical examination, the candidate shall be a graduate, of at least seven years' standing, of a medical school approved by the American College of Surgeons.

The candidate shall give evidence that he has served at least one year as interne in a creditable hospital and two years as surgical assistant, or he shall give evidence of apprenticeship of equivalent value. As a means of furnishing precisely the information desired it is requested that the "application for fellowship" (obtainable from the bureau) be filled out and submitted with the applicant's case reports.

Letters also may be submitted by the candidate testifying as to his personal traits as well as to his professional qualifications.

The professional activity of the candidate shall be restricted to the study, diagnosis, and operative work in general surgery or in special fields of surgery, such as eye, ear, nose, and throat, genito-urinary, orthopedics, and gynecology and obstetrics.

As evidence of his qualifications in the technique of surgery the candidate is required to submit in complete detail, through official channels, the case records of 50 consecutive major operations which he has performed himself.

In addition to the complete records of 50 consecutive major operations the candidate is asked to submit in brief abstract a report of at least 50 other major operations in which he has acted as assistant or which he has performed himself.

The senior medical officer with whom the candidate is serving, when forwarding these case records and the abstract of major operations in which the candidate has assisted, shall furnish, by means of an appropriate indorsement, his estimate of the candidate's qualifications for fellowship.

The attention of prospective candidates is invited to the desirability of having case reports typed on paper of cap size, suitably arranged and bound, and prefaced by both an index to cases (Form P), and a summary giving the total number of operations of each type; e. g., appendectomy, 14; cholecystectomy, 2, etc.

It is important further that each case be identifiable by recording (a) institution; (b) hospital number; (c) date; (d) initials.

The candidates for fellowship nominated in 1926 by the Surgeon General are:

Lieut. Commander John F. Riordan, Medical Corps, United States Navy.

Lieut. Commander Frederick L. Conklin, Medical Corps, United States Navy.

Lieut. Commander Elphege A. M. Gendreau, Medical Corps, United States Navy.

Lieut. Commander Francis E. Locy, Medical Corps, United States Navy.

Lieut. Commander Horace R. Boone, Medical Corps, United States Navy.

Lieut. Commander Lewis G. Jordan, Medical Corps, United States Navy.

Lieut. Henry C. Weber, Medical Corps, United States Navy.

RESIGNATION AFTER SPECIAL COURSES

In spite of frequent statements from the department to the effect that those officers of the Navy—medical as well as others—who receive the benefits of special courses of instruction are expected, and should expect, to render some adequate return to the Government for the money spent in furthering their education, it is still a not infrequent occurrence for an officer to request the acceptance of his resignation shortly after completing his course. The policy of the department is to refuse such requests and to require such an officer to serve at least three years in the Navy after completion of any special course of instruction. In fact, in accordance with departmental instruction, issued September 21, 1925, all officers requesting post-graduate courses are required to submit with their requests a signed agreement to serve for at least three years after the course is completed.

Formerly an officer who desired to take a special course was requested to state that it was his intention to remain in the service. As this did not prevent resignations from being submitted, it became necessary to have such officers state that they will serve for three years. This is only fair to the Government and should be so recognized.

That the United States Navy is not the only service which has suffered from early resignations following special courses is shown by the fact that the Royal Army Medical Corps of Great Britain has recently adopted the plan in use in our Navy and now requires all officers who undergo "the senior course of instruction for captains prior to promotion to major, or a specialist course," to "sign an honorable undertaking to continue to serve in the army after the termination of the course for a minimum period of three years." Under very exceptional circumstances, such an officer may be allowed to resign, but will be required to join the Regular Army Reserve of Officers.

STUDY COURSES FOR HOSPITAL CORPS RATINGS

A new edition of study courses for Hospital Corps ratings will soon be ready for issue by the Bureau of Navigation. The courses should prove valuable to those seeking advancement as well as those who are charged with the systematic instruction of members of the Hospital Corps.

As the courses have been prepared under the direction of the Bureau of Medicine and Surgery to meet the requirements of the various Hospital Corps ratings, candidates naturally assume that examination for advancement will be based on the courses.

It is believed that the pamphlets constituting the courses will be of assistance to examining boards in determining the scope of questions appropriate for the various Hospital Corps ratings.

NURSE CORPS

LABORATORY EXPERIENCES WITH EPIDEMIC CEREBROSPINAL MENINGITIS

By S. RUTH HASSLER, Nurse, United States Navy

An epidemic of cerebrospinal meningitis occurred at the Great Lakes (Ill.) United States Naval Training Station, beginning February 16, 1926. There were 21 cases with 3 deaths.

During the period of the epidemic about 200 patients were admitted with acute infections. The majority of cases proved to be acute catarrhal fever.

All cases admitted with fever had an immediate white blood count and throat culture made. Throat cultures were made by swabbing the nasopharyngeal region and inoculating a blood agar medium plate. All cases with a white blood count of 20,000 or more had a blood culture made. All early white blood counts of 25,000 or more proved to be due to pneumonia or cerebrospinal fever, excepting one case of empyema.

The average white blood counts of cerebrospinal cases ranged from 25,000 to 35,000, with a polymorphonuclear count of from 90 to 95 per cent. It was not unusual to find an increase of 10,000 white blood cells within a few hours. An exceptional case showed no increase of white blood count at any time.

Blood cultures revealed the septicemic form of cerebrospinal fever by showing Gram negative diplococci in stained smears of the film found in flasks of glucose bouillon. Seventeen cases showed positive blood cultures of Gram negative diplococci. Seven cases never passed beyond the septicemia stage.

Growth was found in blood cultures as early as 12 hours and, at times, not until the third day. It was necessary at times to fish for the growth with a pipette rather than with a platinum loop. A heavy film was made upon a slide and allowed to dry. This often revealed the organisms which were not to be found by fishing with a platinum loop.

Blood was collected for culture in 1.5 per cent sodium citrate solution; approximately 10 cubic centimeters of the patient's blood was planted in 50 cubic centimeters of glucose bouillon.

For the base bouillon—beef infusion broth—the pH adjusted to 7.4 was used; 1 per cent glucose and 1 per cent calcium carbonate were added. This proved to be a very satisfactory medium.

In the beginning of the epidemic the blood culture in glucose bouillon was checked by planting blood in glucose agar. Three plates containing 0.5, 1, and 3 cubic centimeters of patient's blood were made. In a few instances a growth was obtained, but the plates dried too quickly and therefore were not nearly so dependable as the glucose bouillon cultures and were discontinued.

Transplanting growth from the glucose bouillon onto blood agar slants, typical colonies of meningococci developed, which produced a positive agglutination with antimeningococcus serum.

Human blood was used mostly for making blood agar slants and plates. It proved to make a satisfactory medium. Sheep's blood was used at first, but, being difficult to obtain, human blood was resorted to.

The diagnosis of the meningeal form of cerebrospinal fever was based on the finding of Gram negative diplococci in the smears or cultures from the spinal fluid.

Stained smears of spinal fluid showed the organisms to bear a striking resemblance to the gonococci.

The variation in size of the cocci in the same smear was a noticeable feature. This dissimilarity in size was more noticeable in cultures.

When the spinal fluid was turbid large numbers of polymorphonuclear leucocytes were to be found. In some instances only a few organisms could be found after a prolonged search, while in other spinal fluids the organisms were numerous.

Two clear spinal fluids in which no organisms could be found produced a growth of meningococci on blood agar slants.

In culturing spinal fluid, 1 to 2 cubic centimeters was planted on a blood agar slant. Loeffler's medium was tried, but was found not satisfactory; blood agar plates were not entirely satisfactory, as the meningococci grew better where there was no moisture, such as water of condensation. A tube of spinal fluid was also placed in the incubator and growth was usually checked with the culture on the blood agar slant. As the meningococcus is very sensitive to cold, a supply of culture media for immediate use was kept in the incubator. With virulent infections, growth from the spinal fluid cultures was obtained in 24 hours; with less severe infections, growth was usually not seen before 48 hours.

On blood agar the meningococcus colonies did not produce any change in the blood. They were larger than streptococcus or pneumococcus colonies and appeared discrete and very slightly hazy; about 2.5 millimeters in diameter.

A spinal cell count proved to be of great value, as a clear fluid at times would show a cell count of over 100 cells per cubic millimeter. Turbid fluids showed counts between 1,000 and 30,000. The absence of sugar in the spinal fluid was noted only after the meningococcus had been found. Increase of globulin was noticed as the cell count increased. The colloidal gold curve showed reduction in the tubes 6, 7, 8, 9, and 10. With two cases all tests at first were normal. When, a few hours later, a second lumbar puncture was made, each case showed a turbid fluid with many pus cells and Gram negative diplococci. Two cases were definitely arrested after infection of the spinal fluid had taken place, as shown by cultures.

Serum treatments were controlled by cultures and discontinued when cultures were negative. The color of the spinal fluid varied from a slight opalescence at the onset of the disease to a yellowish green later in its course. The fluid remained turbid throughout the course of the disease. In a few cases, in the early stage, the fluid was clear and colorless; a cell count of over 100 cells per cubic millimeter was noted, but no organisms could be found.

After standing one-half hour and longer the fluid formed a sediment, changing in character as the disease developed.

(a) In the early states of the disease the pellicle was found to be made up of a yellowish-white network. The upper portion of the network was balloon or dome shaped and the lower portion flattened in appearance. The whole network resembled a bursa. It did not reach the upper level of the fluid and was noticed to incline toward one side of the tube.

(b) In the more advanced stage of meningitis the sediment formation was firmer and was noticed to spread out along one side of the tube in the form of a heavy film.

(c) In still more advanced cases a sediment of yellow granules was seen attached to one side of the tube.

(d) In very grave cases the sediment was thick and fell by gravity to the bottom of the tube.

When the disease receded, the pellicle or sediment took on a form the reverse of the one that appeared at its formation.

Throat cultures, besides being made on all cases of meningitis, were made on all suspicious cases with fever, as well as on all patients and attendants exposed to a case. Cultures were made on blood agar plates rather than on slants to facilitate isolating colonies. After 24 hours the plates were examined and suspicious colonies fished and tested for agglutination according to Houghton's modification of Krumwiede's method, which proved simple, expedient, and, after a little practice, fairly reliable. All positive agglutinations were dried and stained by Gram's method. In the majority of positive agglutinations clumping of Gram negative diplococci was demonstrated, but

in a few instances clumping was found to be caused by a Gram negative bacillus. Positive results were considered only as confirmative evidence of meningococcus infection, as many carriers were found.

The slide agglutination method used was considered by us much more satisfactory than a fermentation test.

HELP FROM THE LABORATORY

By RUTH B. MENTZER, Nurse, United States Navy

The function of a naval hospital laboratory is to aid the medical officer in the scientific care of his patients. The service is a very active working department of the institution, as, in addition to actually doing clinical work, hospital corpsmen are trained by the doctor and the nurse to carry on in this branch of work aboard ships and at smaller stations. The duty of training the hospital corpsmen falls more especially upon the nurse, as the doctor has other duties assigned him which demand his absence from the laboratory. This condition places considerable responsibility upon the nurse and affords the corpsmen an opportunity of doing some of the clinical work. If they make discoveries, they are given credit for it.

When the fleet came to Newport during the summer of 1926 a sailor was admitted to the hospital with a diagnosis of hemorrhoids. Complaint—bleeding at stool and soreness of abdomen of several months' duration. During that time he had lost 20 pounds in weight and was steadily losing, although he felt well. Appetite was good, and there was no nausea or vomiting. A few days after admission he passed bright red blood at stool but had no acute pain. Family and past history—negative. Duty in the Tropics during past two years. No history of venereal disease. Proctoscopic examination—external hemorrhoids, very mild degree; varicosities of internal hemorrhoidal veins, with no evidence of recent hemorrhage or chronic infection. The laboratory findings are: Wassermann and Kahn tests—negative. Urinalysis—negative. One thousand seven hundred and fifty cubic centimeters in 24 hours. WBC, 6,000; RBC, 4,090,000; Hg., 80 per cent; Polys., 78; Lymphs., 21; Eos., 1. *Filaria sanguinis-hominis* found in blood smear (Bancroft). Diagnosis changed to filariasis. Treatment with neosalvarsan was given, and it was recommended that patient be continued aboard ship.

A United States Veterans' Bureau patient was admitted with a diagnosis of appendicitis, chronic. Chief complaint—a steady, aching pain under lower ribs on right side. Patient under par. Family and past history—negative. Always healthy. Present illness dated back two years; lost 30 pounds in weight in that time.

No cough or hemoptysis. No excessive use of alcohol. Smokes a great deal. After complete physical examination and clinical study, including radiography, fluoroscopic examination, routine laboratory work, urinalysis, gastric analysis (free HCL, 58 per cent), blood picture, Wassermann and Kahn tests, examination of stools for parasites and ova—all negative—the impression was "chronic appendicitis." Exploratory laparotomy—appendectomy performed. No gall stones in gall bladder; stomach explored (no evidence of ulcers); appendix bound to lateral wall. Spinal anesthesia was used.

Immediate postoperative reaction was good. On the second day after operation patient complained of nausea and vomiting. These were controlled by gastric lavage with sodium bicarbonate. Symptoms of paralytic ileus, with grave impairment of renal function, set in. Dehydration was controlled by 5 per cent glucose solution intravenously, hypodermically, and by proctoclysis. Insulin also given. Laboratory findings were as follows: WBC., 5,000; Polys., 67; Lymphs., 24; L. Mono., 4; Trans., 5. Urinary output, 1,260 cubic centimeters in 24 hours. Blood chemistry showed: NPN, 200; urea, 100; uric acid, 15; creatinine, 3.7; sugar, 190. The ileus appeared to subside, but the uremic symptoms progressed. Blood chemistry then showed: NPN, 200; urea, 100; uric acid, 15; creatinine, 3.7; sugar, 40; chlorides, 528. Patient remained in coma for six hours and then died.

A radioman, second class, was admitted from one of the ships with a diagnosis of hyperthyroidism. Chief complaint—pains about heart, which began about a year ago. There were periodical attacks of about 10 days' duration. A tremor of the hands following the attacks developed. Hands sweat profusely. Patient is emotional and irritable. Family history—negative. Past history—was wrestler for two years. Received treatment at a hospital for seven months following "gassing at the front" with the First Division.

The usual physical examination was made. Lungs, eyes, ears, nose, and throat were negative. Heart, normal, not enlarged and no evidence of myocarditis. B. P., 150/90. Since admission, had lost 15 pounds in weight. Has occasional attacks of cardiac distress and a fine tremor of hands, tongue, and head. No exophthalmos. Patient thinks symptoms are similar to shell shock for which he was treated during the war. Routine laboratory work all negative. Hydrotherapy administered without results. Tremor became more marked and he continued to lose weight. Four basal metabolic rates were done, with an average of minus 8 per cent and a parallel pulse rate ranging from 64 to 72 during tests. Diagnosis changed to psychoneurosis. Patient considered unfit for duty. Surveyed and

transferred to United States Naval Hospital, Washington, D. C., for further observation and treatment.

The diagnoses in two of the above-mentioned cases, in the opinion of the doctors, were definitely established by laboratory procedures. In the United States Veterans' Bureau case the prognosis was most unfavorable in view of the blood chemistry findings. All of this work done in the laboratory, before a final decision is made, is approved by the laboratory officer.

SOME INTERESTING LABORATORY WORK

By FRANCES C. BONNER, Nurse, United States Navy

Sometimes we laboratory workers feel the need of the unusual to make us realize we are doing something worth while. Routine becomes monotonous to all, but each day even the simplest tests have unusual findings, and satisfaction is in this way derived.

Recently at the naval hospital, Brooklyn, N. Y., a patient was suffering from a supposedly infected arm. A request was sent to the laboratory to make smears and cultures from the infected area. The cultures were made on brain broth, plain agar, and blood agar. Two smears were made also, the first one stained by Gram's method. On examination it was found to contain numerous large Gram positive bacilli, encapsulated. The organism was not one of the usual everyday "finds," and the entire personnel became interested. It proved to be Welch's bacillus, or the bacillus of gas gangrene, so commonly found during the late war but unusual in ordinary times. We made many cultures and inoculated a rabbit intravenously. The rabbit lived about two hours, and then the body was placed in the incubator for several hours. On opening the door it seemed as though the body was distended to such a degree that it would be impossible to remove it, and the odor was vile. We managed to remove it to another room outside the laboratory, and an autopsy was performed. As soon as the knife penetrated the peritoneal cavity the gas escaped in abundance and the body flattened out. The odor of the gas could be detected for some distance from the room. The internal organs of the rabbit presented a wrecked appearance, all of them being bright red and spongy looking. It was with great difficulty and only by careful handling that the operator could distinguish one organ from the other to enable us to make smears and cultures. The organism was recovered in the smears from the heart's blood, but the cultures were not so satisfactory. The patient died the evening of the same day we made the first smears. The findings on the rabbit were most interesting and very valuable.

About three months later another case of "gas gangrene" developed. The organism was found in the first smears; not so typical as in the foregoing case, but definite enough to warrant amputation of the patient's leg in order to save his life. There are many instances where the laboratory is an invaluable aid to the medical officer in helping to diagnose unusual cases. I believe the work of the laboratories will be of increasing value each year as there are so many new and simpler tests which, after careful study and use, are for the benefit of the laboratory workers who have very little time for experimenting.

In the Navy we have the Naval Medical School to do our experimental work for us, and in this way all the naval hospitals receive the benefit of the knowledge and experience of those at the school. For instance, the Kahn test for syphilis has been adopted as the routine test by the Navy, not because it is so much easier to perform but because the results have proved it practical and useful. It will take some time for all medical officers to see it this way. The Wassermann test has been in use for so long that it will take time for the Kahn test to be accepted in the same way.

While we were just beginning to become interested in the test at this hospital, we had the great pleasure of having Doctor Kahn demonstrate his technique and interpret the results. It was a great satisfaction to those who attended his demonstration and it cleared up for the laboratory worker many little doubts about the test in general. I believe in the hands of a careful worker the test will prove very useful and practical.

We are now working on an interesting case of granuloma inguinale. According to statistics it is the second case found in a white man in this country. Much more will be written about this later.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,
UNITED STATES NAVAL MEDICAL BULLETIN,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

THE TREATMENT OF FRACTURES, *With Notes Upon a few Common Dislocations*,
By Charles Locke Souder, A. B., Ph. B., M. D., F. A. C. S., Consulting Surgeon to the Massachusetts General Hospital; Formerly Assistant Professor of Surgery at the Harvard Medical School, etc. Tenth edition, revised. W. B. Saunders Co., Philadelphia, 1926.

This new edition of the standard work on the subject of fractures is bigger and better than its predecessors and contains the latest information.

It is a well-balanced book with a high level of excellence throughout. Certain chapters seem to the reviewer to be of especial merit. These are, "Head injuries," "Skeletal traction," "Operative treatment of fractures," "Conduct of open operations on fractures," "Surgical approach to the bones," and "The surgeon and the law." There is an increase of nearly 500 pages over the ninth edition, a large part of which increase is devoted to the surgical aspects of fractures.

For the practitioner who sees only an occasional fracture and can call in a specialist if he gets into deep water it is possibly too thorough in its discussions, but for those of us who are constantly encountering fractures of all kinds it is indispensable. The book should be in the libraries of all naval hospitals.

A TEXTBOOK OF UROLOGY, by Oswald Swinney Lowsley, A. B., M. D., F. A. C. S., Director of the Department of Urology (James Buchanan Brady Foundation) of the New York Hospital; Consulting Urologist to the Hospital For the Ruptured and Crippled, etc., and Thomas Joseph Kirwin, Ph. C., B. S., M. A., M. D., Chief of Clinic of the Department of Urology (James Buchanan Brady Foundation) of the New York Hospital; Assistant in Urology, Cornell University Medical College, etc. Lea and Febiger, Philadelphia, 1926.

A book emanating from these authors fills one with the expectation of excellence, for all of their previous work has been of a very high

grade. This expectation is realized in a most satisfying manner, for, as we read the book, we are continually impressed with the clarity and thoroughness of its text and illustrations.

It is stated in the book that "The marvelous progress made in urology during the last few years has been due in large measure to the introduction of improved mechanical equipment" and "It is not too much to say that urological diagnosis now rests almost entirely upon the findings of the microscope, the cystoscope, and the Roentgen ray." The value of local and regional anesthesia in urology is the subject of repeated comment and these authors are enthusiastic advocates of its use.

This is an extremely practical book, both as a reference work and for every-day use. It is better adapted for general issue to the medical officers of the Navy than any other book on this subject that we have seen.

STEDMAN'S MEDICAL DICTIONARY, by *Thomas Lathrop Stedman, A. M., M. D.* Ninth, revised edition. William Wood & Co., New York, 1926.

The ninth edition of this medical dictionary contains several hundred new titles and many necessary changes in order to conform with new editions of the United States Pharmacopœia and National Formulary. It commends itself to the practitioner and student of medicine because of its thorough, clear-cut definitions, which are not too brief but have the happy faculty of conveying to the reader sufficient detail and information to reward him for his search.

This volume contains many excellent cuts and prints, some of which are colored, and contains an appendix with an alphabetical table of drugs with their dosage and indications.

This ninth edition is one of the most complete, thorough, and practical medical dictionaries available to the student of medicine and will prove a valuable addition to any medical library.

POLITZER'S DISEASES OF THE EAR, by *Milton J. Ballin, M. D., Ph. B., Attending Oto-rhino-laryngologist, Bronx Hospital, New York, etc.* Sixth edition, revised and largely rewritten. Lea & Febiger, Philadelphia, 1926.

Politzer's textbook has long been valuable for both students and practitioners of medicine. The recent advances have brought forth this sixth edition of 776 pages of clear type on excellent paper. The volume has been improved by many up-to-date articles on the pathology and treatment of aural affections, with special reference to the internal ear.

The size of the book has been somewhat reduced through the omission of less important items, making it more practical for refer-

ence. The anatomy and physiology of each division of the ear is clearly presented in an interesting style; following this the modern methods of physical examinations and the tests for hearing are given. Theories of sound perception are discussed by the author. The cortical center of hearing, both from a physiological and clinical point of view, is considered.

The diagnosis, pathology, and treatment of the diseases affecting both the sound conducting and perception apparatuses are clearly and concisely presented. Discussions of allied affections of the nasopharynx and accessory sinuses of the nose follow. This new edition by an established authority will prove a valuable asset as a textbook or ready-reference book.

DISEASES OF THE NOSE AND THROAT, by *Sir St. Clair Thomson, M. D., F. R. C. P. (Lond.)*; *F. R. C. S. (Eng.)*. Third edition. D. Appleton & Co., New York, 1926.

Medical officers in the naval service who are often called upon to treat diseases of the nose and throat should find this textbook very helpful. It is essentially a practical treatise, systematically arranged, conducting the reader from the simple to the more complex methods of examination and procedure. The preface for the first edition stated that the author had kept two things in mind—that it should be a guide to senior students and also for the general practitioner. From his own experience he realized the needs in general practice, and that a too narrow view should be avoided by the specialist. It is to be expected that the more difficult operations should only be attempted by specialists of experience and training, but the isolated practitioners—and this is often true in the Navy—should be able to recognize and treat many of the simpler diseases as well as to diagnose the more serious conditions for further reference to a specialist. The illustrations are well chosen and instructive, confirming the text descriptions. The use of large type for the most important subject matter and small type for the more academic discussions has its value for quick reference. Special attention has been given to the more common diseases and also operative technique. The chapters on adenoids, enlargement of the tonsils, tuberculosis, and syphilis are especially fine. The appended formulas, referred to by numbers throughout the book, will no doubt be found useful. There has been a need for several years for such a book, brought up to date, including the latest views of certain diseases and new methods of procedure. The author in his preface to this third edition has outlined the many changes and additions which have been made.

THE MODERN TREATMENT OF HEMORRHOIDS, by *Joseph Franklin Montague, M. D., F. A. C. S., of the Rectal Clinic, University and Bellevue Hospital Medical College; Lecturer of Rectal Pathology; etc.* Foreword by *Harlow Brooks, M. D., F. A. C. P., Professor of Medicine, University and Bellevue Hospital Medical College; etc.* Price, \$5. J. B. Lippincott Co., Philadelphia, 1928.

This book offers nothing radically new, except perhaps an original point of view and a refreshing enthusiasm. It does give a most thorough exposition of the pathology, signs and symptoms, diagnostic methods, and data, as well as treatment.

There is a careful study of the influence of heredity, with the conclusion that a weakness of the vascular tissue may be inherited. All the various methods of treatment are discussed—prophylactic, palliative, operative, injection, radium, and electrothermic. The description of the technic of operation is accompanied by diagrams and photographs illustrating each step, which makes it all beautifully clear. Altogether, it is a most satisfactory book.

A PRACTICE OF PHYSIOTHERAPY, by *C. M. Sampson, M. D., Formerly of the Physiotherapy Service, Walter Reed United States Army General Hospital, Washington, D. C., etc.* The C. V. Mosby Co., St. Louis, 1928.

There is probably no person better qualified to write on the technic and the physics of this subject than Doctor Sampson. Also, there is probably no greater enthusiast in interpreting the results of treatment. I know of no other guide to physiotherapy so valuable to follow as this book, but one should not be disappointed if his results are not quite so satisfying as those described.

The author is undoubtedly correct in saying that physiotherapy is an indispensable part of medical and surgical practice; that it can do its best work in institutions such as general hospitals; that it requires special training and experience, and that it requires much more time than can be given it by men following other specialties.

The whole field of physical remedies is covered. The author divides them into thermal, chemical, mechanical, and electronic remedies.

It seems probable that this book will become the standard textbook of physiotherapy.

THE SURGICAL TREATMENT OF GOITER, by *Willard Bartlett, A. B., A. M., M. D., D. Sc., F. A. C. S., St. Louis.* With foreword by *Dr. Charles H. Mayo, Rochester, Minn.* The C. V. Mosby Co., St. Louis, 1928.

This monograph is intended as a study in detail of the elaborate procedure involved to-day in the preparation, operation, and after-care of goiter patients.

It includes a chapter on the historical aspects of goiter surgery; one on "Pathology," by Louis B. Wilson; one on "The heart in goiter," by Samuel B. Grant. Other valuable chapters are "Indi-

cations for surgical treatment," "Preparation of the patient for thyroidectomy," "Ligation," "Anesthesia," "Details of technic," "Complications," and "Aftertreatment."

Everyone who is interested in the treatment of goiter should read this book, whether he be internist or surgeon. The chapter on "Indications for surgical treatment" would alone be worth the price of the book to those of either group. The subject is discussed so thoroughly, with such fairness and such consideration of the views of others, that it makes a most valuable guide. The conclusions reached by an author of such experience and such high standing are most important.

This book would be a valuable addition to the libraries of naval hospitals.

PATHOLOGY AND TREATMENT OF THE INFLAMMATORY DISEASES OF THE NASAL ACCESSORY SINUSES, by Prof. Dr. M. Hajek, Chief of the Laryngo-Rhino-Otological Clinic, University of Vienna. Translated and edited by Joseph D. Heitger, A. B., M. D., Louisville, Ky., and French K. Hansel, M. D., M. S., St. Louis, Mo. Fifth edition, completely revised and enlarged. Two volumes. The C. V. Mosby Co., St. Louis, 1926.

This new edition appears after a hiatus of 12 years, during which time there has been a great deal of change in the field of the inflammatory diseases of the nasal accessory sinuses.

Considerable attention is given to the establishment of indications for the numerous current operative methods, with emphasis placed on the importance of conservative methods.

These books are strictly for the use of the specialist, to whom they will be of permanent value.

LIFE INSURANCE MEDICINE, Vol. I, published by *New England Mutual Life Insurance Co.*, Boston, 1926.

This volume contains articles by members of the medical department of the New England Mutual Life Insurance Co. These deal primarily with the patient from the standpoint of the life-insurance examiner. The practical methods employed in determining the insurability of a candidate may frequently be adopted by the clinician with excellent results.

This company believes in the value of medical examination for life insurance as opposed to the so-called nonmedical selection which has been adopted by some life-insurances companies at present.

The article by Doctor Dwight stresses the importance of deaths from circulatory disease and presents some valuable tables showing the distribution of these deaths for certain areas, both rural and urban, and also the bearing of occupation on the relative frequency of circulatory disease.

He reaches the interesting conclusion that the incidence of circulatory disease is in inverse relation to the amount of physical exer-

cise which the group takes in the open air and, other things being equal, is in direct relation to the amount of nervous and mental strain.

Doctor McCrudden stresses the importance of thoroughness in periodic health examinations. He believes that the difficulty is not so much that the physician does not know how to make the examination as that he does not take the necessary time and pains. Doctor Frost discusses in detail the cardiorespiratory test for circulatory efficiency. This test appears to have great possibilities, but it appears probable that it could be further simplified by eliminating some of the steps without interfering greatly with its value.

This volume reflects great credit on the medical staff of the New England Mutual Life Insurance Co. and will prove a valuable addition to medical literature.

MEDICAL GYMNASTICS AND MASSAGE IN GENERAL PRACTICE, by *Dr. J. Arvedson*, *Arvedson's Gymnastic Institute, Stockholm*. Translated and edited by *Mina L. Dobie, M. D., B. Ch., Medical Officer, Chelsea College of Physical Education*. Sixth edition. P. Blakiston's Son & Co., Philadelphia, 1926.

This book describes the morbid conditions in which medical gymnastics and massage may be used to advantage and tells what treatments to use. It does not describe or give the technic of the various exercises and treatments. It will be useful to those who are engaged in physiotherapy or have occasion to prescribe it.

ELEMENTS OF PATHOLOGY, by *Aller G. Ellis, M. Sc., M. D., Rockefeller Foundation Visiting Professor of Pathology and Director of Studies, Medical Department of Chulalongkorn University, Bangkok, Siam, etc.* P. Blakiston's Son & Co., Philadelphia, 1926.

This is essentially a teaching book and the matter is so arranged as to facilitate this object. Wherever appropriate, the first paragraph of each chapter is a brief statement of what it is the purpose of the chapter to teach, while the closing paragraph is a brief summary, suitable for a quick review.

The facts are clearly and briefly stated. The illustrations are largely diagrammatic and avoid the confusion of unessential details. It is a book from which the beginner can learn easily and it is recommended to those engaged in teaching this subject.

FUNDAMENTALS OF DERMATOLOGY, by *Alfred Schalek, M. D., Professor of Dermatology and Syphilology, University of Nebraska College of Medicine, etc.* Lea & Febiger, Philadelphia, 1926.

More than a compend, less than a text-book, this little volume contains only what its title indicates. For quick reference by the student and practitioner of medicine, it will be found useful. In it the skin diseases, including syphilis, are arranged in alphabetical

order and very briefly discussed. The treatment advocated consists in the main of the familiar, tried remedies. The illustrations are clear and sufficient in number.

GOULD'S MEDICAL DICTIONARY, by *George M. Gould, A. M., M. D.* Edited by *R. J. E. Scott, M. A., B. C. L., M. D., Fellow of the New York Academy of Medicine.* P. Blakiston's Son & Co., Philadelphia, 1926.

Gould's dictionaries have been standard for so long a time that the appearance of a new one of larger size is an event of importance in medical literature. The present Gould contains approximately 76,000 words—of which 5,000 are new—all of which are concisely defined and yet defined at sufficient length to enable one to grasp the meaning without difficulty. The book is attractively bound in soft blue leather, and is indented for convenience in reference. The print is large enough for easy reading and the illustrations are exceptionally good. Gould's Medical Dictionary will be found very serviceable by medical men.

RÖNTGEN INTERPRETATION, A Manual for Students and Practitioners, by *George W. Holmes, M. D., Röntgenologist to the Massachusetts General Hospital and Assistant Professor of Röntgenology, Harvard Medical School,* and *Howard E. Ruggles, M. D., Röntgenologist to the University of California Hospital and Clinical Professor of Röntgenology, University of California Medical School.* Third edition, revised. Lea & Febiger, Philadelphia, 1926.

Here is a real practical handbook, to which even the most experienced Röntgenologist may turn with profit.

It is emphasized throughout that a knowledge of the normals must precede any effort to evaluate variations from the normal. One statement, which indicates the lack of dogmatism in the book, is worth quoting. "A Röntgenogram showing only one view is an isolated observation, and is to be relied upon less, perhaps, than a single observation in any other branch of medicine."

The more one reads the book, the more one realizes why it has lived to the third edition and will survive through many more. It is recommended to surgeons and interns, as well as to röntgenologists.

OUTLINES OF COMPARATIVE ANATOMY OF VERTEBRATES, by *J. S. Kingsley, Professor of Zoology, Emeritus, University of Illinois.* Third edition, revised. P. Blakiston's Son & Co., Philadelphia, 1926.

This is a companion volume to *The Invertebrate Skeleton*, which was reviewed in *THE BULLETIN* of December, 1925.

Each organ is considered in turn. The development and relations in each of the vertebrates are fully described. There is an elaborate bibliography.

THE THYROID GLAND, by *Prof. Charles H. Mayo* and *Prof. Henry W. Plummer*. Beaumont Foundation, Annual Lecture, Course IV, 1925. The C. V. Mosby Co., St. Louis, 1926.

An authoritative résumé of thyroid disease in the shape of lectures delivered under the auspices of the Wayne County Medical Society, of Detroit.

THE DENTAL ASSISTANT, by *Emma J. McCaw, R. N.* With an introduction by *Dr. C. N. Johnson*. The C. V. Mosby Co., St. Louis, 1926.

In this little book a member of the nursing profession discusses in a broad and interesting manner her duties as a dental assistant. In addition to giving many useful hints relative to the handling and treatment of patients, the book describes clerical and technical procedures carried on by the dental assistant. It may be read profitably by every member of the dental profession and his assistant.

A MANUAL OF PROCTOLOGY, by *T. Chittenden Hill, Ph. B., M. D., F. A. C. S.*, *Instructor in Proctology, Harvard Graduate School of Medicine; Surgeon to Rectal Department, Boston Dispensary; Ex-President American Proctologic Society*. Second edition, thoroughly revised. Lea & Febiger, Philadelphia, 1926.

A very practical manual designed for the student but equally useful for the practitioner.

THE DIVISION OF PREVENTIVE MEDICINE

Commander J. R. PHILIPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

REACTIONS INCIDENTAL TO THE ADMINISTRATION OF 91,707 DOSES OF NEOARSPHENAMINE AND OTHER ARSENICAL COMPOUNDS IN THE UNITED STATES NAVY

Since November, 1924, medical officers of the Navy have been required to report the numbers of doses of arsphenamine, neoarsphenamine, and so forth, administered each month, together with a brief but satisfactory description of every case in which ill effects were noted. The following is a summary of reports for the month of December, 1924, and subsequent months to and including August, 1926.

ARSENICAL COMPOUNDS USED IN THE TREATMENT OF SYPHILIS

Numbers of severe reactions as compared with doses administered from December 1, 1924, to September 1, 1926

Preparation	Severe reactions	Number of doses administered	Ratio: severe reactions to doses administered
Arsphenamine.....	21	9,151	1-436
Neoarsphenamine.....	100	79,421	1-794
Sulpharsphenamine.....	0	1,301	-----
Tryparsamide.....	0	1,834	-----
Total.....	121	91,707	1-758

Numbers of mild, severe, and fatal reactions, and ratio between fatal reactions and numbers of doses administered

	Mild reactions ¹	Severe reactions ²	Fatal reactions	Ratio: fatal reactions to doses administered
Arsphenamine.....	12	9	0	-----
Neoarsphenamine.....	73	23	4	1-19,855
Sulpharsphenamine.....	0	0	0	-----
Tryparsamide.....	0	0	0	-----
Total.....	85	32	4	1-22,927

¹ More or less severe but not alarming in character.

² Immediate and shocklike or otherwise alarming in character. Would include dermatitis exfoliativa, purpura hemorrhagica, convulsions, jaundice with other symptoms of arsenical poisoning, etc.

It should be stated that the figures shown in the summary probably do not very closely represent future expectancy regarding fatal and nonfatal severe reactions. In December, 1924, the first month during which the present system of following the effects of these drugs was operative, 1,973 doses of arsphenamine, neoarsphenamine, etc., were administered in the Navy. Nine reactions of greater or less severity were reported, making the ratio 1 to 219 doses. While a few doses of sulpharsphenamine were reported, in nearly all cases the various arsenical compounds, then and since, were administered intravenously.

During the 21 months covered by the summary the numbers of doses administered increased steadily month by month and the numbers of severe reactions encountered steadily decreased. During the past nine months the average number of doses per month was 4,969. This represents an increase of 151.8 per cent over the number administered in December, 1924. The decrease in numbers of severe reactions per 1,000 doses has been almost as striking as the increase in the numbers of doses given—minus 84.9 per cent as compared with plus 151.8 per cent.

Inasmuch as December, 1924, was the first month for which these statistics were collected, the data for that month have been kept separate from those of later months. From January 1 to June 30, 1925, the average number of doses administered per month was 3,795 and the average number of severe reactions, 9.16; or 2.41 per 1,000 doses, or 1 to 414 doses.

During the following five months, which completed one year of the observation period, the average monthly number of doses was 4,447, and the average number of severe reactions reported per month was 5.2, or 1.17 per 1,000 doses, or 1 to 855 doses administered.

During the past nine months—December 1, 1925, to August 30, 1926—the average monthly number of doses was 4,969 and the average number of severe reactions per month was 3.4, or 0.69 per 1,000 doses, or 1 to 1,442.

A number of possible reasons might be mentioned to account for the upward trend in numbers of doses administered from month to month and for the marked decrease in numbers of severe reactions reported. The increasing numbers of doses were not given because of more new cases of syphilis to treat. There were 94 fewer admissions from syphilis in 1925 than in 1924, and during the first six months of 1926 the admission rate was 14 per cent less than the 1925 rate.

It is difficult to escape a conclusion that increasing attention has been paid to the treatment of new cases as discovered and that old cases have received more follow-up treatment. It is possible that

medical officers, by and large, have been stimulated to this end by articles published in the UNITED STATES NAVAL MEDICAL BULLETIN. If so, the result is in the nature of a response to the declared policy of the Surgeon General of the Navy that syphilis is so serious a disease that every case should receive the most careful consideration and the best possible treatment. The knowledge that the Bureau of Medicine and Surgery is keeping careful record of the statistics of syphilis, and numbers of doses of arsenical compounds administered, and that a careful study is made of case reports, may also have had some effect.

With regard to the decreasing percentages of severe reactions, it should be stated that as a result of several reactions that were alarming in character, the Bureau of Medicine and Surgery directed in January, 1925, that the use of neoarsphenamine of a certain lot number be discontinued. March 25, 1925, it became advisable, from the numbers and kinds of severe reactions reported by various naval organizations in different parts of the world, to recall all neoarsphenamine of two different lot numbers. Withdrawal of these three lot numbers undoubtedly prevented a number of severe reactions and possibly one or more deaths that would otherwise have occurred. But that would not account for the continuous reduction in the percentages of severe reactions reported during the succeeding period of about 16 months. Probably a number of factors contributed to make medical officers more careful regarding the preparation of patients for intravenous treatment, size of dose, and the technique of administering, especially concerning the appearance of the drug in powdered form and after putting it into solution. It is probable that the standard instructions for the preparation and intravenous administration of arsphenamine and neoarsphenamine for use by the medical departments of the Army, Navy, and Veterans' Bureau, and by the United States Public Health Service, issued July 1, 1922, were more closely adhered to than in previous months and years. At any rate, reports received in the earlier months of the period under review indicated that many medical officers had never heard of the instructions or had forgotten that there were such instructions.

It may occur to the reader that as the months have passed medical officers have been less diligent in reporting severe reactions. That is not probable for the following reasons: (a) The proportion of reactions not to be classed as severe, reported during the last six months, was greater than in earlier months, and (b) the checking of other reports and statistical returns against monthly reports of venereal diseases has shown failure to report severe reactions in very few instances.

In recent months nearly 80 per cent of the reactions reported have been classed as mild. An important object of the study is to collect accounts of reactions that are presumably caused by unusual toxicity of the drug, but some of the reactions as reported have been of such character as to suggest that the symptoms resulted from the destruction of large numbers of treponemata rather than from poisonous action of the drug. In many cases the patients appear not to have reacted in a manner essentially different from what was to be expected, but the symptoms were merely somewhat more pronounced than those experienced by most patients. In compiling the statistics it is not possible to make any distinction between such reactions and mild reactions probably representing poisoning by the drug. The figures given above under the heading, "mild reactions," doubtless include both kinds, as well as mixed types.

During the first seven months of the 21-month period 24,745 doses of arsphenamine, neoarsphenamine, etc., were administered, and 23 ships, stations, and naval hospitals together reported 64 reactions, mild and severe. During the remaining 14 months 66,962 doses were administered, and 36 ships, stations, and naval hospitals reported only 57 severe reactions, of which 44 were classed as mild. Ten were classed as severe and three others were fatal.

Four deaths have occurred since the collection of these data was begun in December, 1924. The returns for about 18,000 doses were made before the first death was reported. The facts in that case were, briefly, that fatal poisoning of the acute hemorrhagic encephalitis type followed the second dose of neoarsphenamine intravenously administered, seven days after the first, to a young man in the primary stage of syphilis. Each dose consisted of 0.9 gram. The first indication of a serious reaction appeared about 56 hours after the injection and the patient died about 70 hours after the injection while in a state of coma preceded by convulsions.

After about 16,000 additional doses had been registered, another death occurred under similar circumstances, except that it is by no means clear that the patient had syphilis. The patient feared he had syphilis and, although a blood Wassermann test was reported as negative, he was given, at his request, two intravenous injections of neoarsphenamine, 0.9 grams each, 13 days apart. Three days after the second dose he consulted the medical officer. He stated that he did not feel well and that he was somewhat weak in the legs. A statement by a patient who has taken neoarsphenamine that his legs are weak or that he is nervous and can not sleep should be carefully considered. The man's temperature was taken and he was examined. He was placed under observation and was told to go to his quarters. The medical officer apparently had malaria in mind

in view of the fact that three malaria infected ports had recently been visited. It apparently did not occur to the medical officer when the man declared he did not feel well that the neoarsphenamine given three days before might be responsible for the symptoms. A few minutes after leaving the sick bay the patient had a convulsion lasting two minutes. The medical officer saw him in the convulsion and thought the case was one of epilepsy. A second convulsion occurred 45 minutes later, followed by a third in about half an hour, and the patient died shortly afterwards. Death occurred about 84 hours after the second injection of neoarsphenamine. The death certificate indicated that a man 32 years of age, who had been in the Navy several years without manifesting symptoms of epilepsy, suddenly developed that disease and died the same day after three convulsions at short intervals. Such an unusual course of events suggested the need for additional information, which was secured, substantially as given above. There was no desire on the part of the medical officer to conceal any fact. He simply was not familiar with the manifestations of this form of poisoning and the comparatively long interval which may occur before serious symptoms appear. If he had read articles previously published in this bulletin, he could hardly have failed to suspect the drug which had been administered three days before.

That case leads one to wonder how often deaths result from the administration of arsphenamine and neoarsphenamine in civil practice without any record of poisoning being made. Fatal reactions that are immediate in onset are perhaps reported in most instances, but there must have been many deaths from poisoning in cases not recorded in the literature where the manifestations of toxic action by the drug did not appear for several days. In some, doubtless, the fatal outcome has been attributed to syphilis or intercurrent disease, but in others, probably, the physician has not thought of arsenical poisoning at all.

About 38,000 more doses of arsenical compounds, for the most part neoarsphenamine, were given intravenously in the Navy before another death occurred. The patient, a Filipino, 29 years old, who had had syphilis for several years without diagnosis, was placed under treatment shortly after a strongly positive Kahn precipitation test was obtained. He was given four intravenous injections of neoarsphenamine in five weeks at intervals of 5 to 7 days, except that 14 days elapsed between the third and fourth doses. The amounts given were 0.6, 0.4, 0.4, 0.6, and 0.75 gram. The first four doses were reported not to have caused any severe reaction. During the period of treatment the patient had continuous fever of mild degree with signs of pulmonary disease. Re-

peated searches were made for tubercle bacilli without finding them. X-ray examination gave evidence of calcified glands in the right upper lobe, but was otherwise negative. About 24 hours after the fifth dose was injected the patient had a convulsion that lasted for a little less than five minutes. Others followed; at first about half an hour apart, but later, convulsive movements became almost continuous. Death occurred about 43 hours after the last injection. Six hours after the first convulsion 15 grams of sodium thiosulphate was given intravenously in 800 cubic centimeters of normal salt solution. Adrenalin chloride, 1 cubic centimeter of 1 to 1,000 solution, was administered hypodermically at four-hour intervals. Post-mortem examination showed edema of the brain and injection of the cerebral cortex. Other findings were lobar pneumonia of the right lungs with congestion of the lower lobe of the left lung; acute nephritis, both kidneys, and chronic fibrinous pleurisy.

The fourth death occurred after 5,000 more doses had been given. The patient was a seaman, second class, 21 years old. He was in the primary stage of syphilis. The first dose of neoarsphenamine was 0.45 gram, given nine days after the appearance of a syphilitic sore. The diagnosis was confirmed by finding *Treponema pallidum* in a smear from the lesion. The second dose, which caused fatal poisoning, 0.6 gram, was given seven days after the first. The first dose was followed by a mild reaction, and the patient was kept in bed for 24 hours. He was also kept in bed after the second dose because of the reaction caused by the first dose. A few hours after the second injection the patient's temperature was 100° F., and he seemed to have a cold in the head. The following day it was noted he was much better, but the next day he complained of backache and stated that he felt nervous. His temperature was 101° F. Physical examination showed intense congestion of the throat and eyes. The lungs were clear. His urine was normal. In the afternoon his temperature rose to 102° F. The pulse was 90. He complained of being nervous, and he was unable to sleep. Morphine, one-sixth grain, and atropine, one one-hundred-and-fiftieth grain, were given subcutaneously without noticeable effect. At 6.30 p. m., or about 56 hours after the second dose of neoarsphenamine, he had a convulsion which lasted about five minutes. Shortly afterwards he was transferred to hospital. He was conscious upon arrival and stated that he had been subject to convulsions all his life. He was given 0.5 gram of sodium thiosulphate intravenously a few minutes later. He rested quietly through the night, but at 6.25 a. m. he had another convulsion. After that, convulsions occurred about every three hours. At 1.30 p. m. he was given 1 gram of sodium thiosulphate intravenously. He had no convulsions during the afternoon, but one occurred at 7 p. m.; and another at 8.30 p. m., which lasted about half a minute. After that, convulsions occurred at intervals until he died at 8.11

a. m. the following morning, about 92 hours after the second dose of neoarsphenamine. Postmortem examination revealed an increased quantity of fluid in the cranial cavities. The cerebral convolutions appeared to be flattened out, and there was marked congestion of the blood vessels throughout the meninges and in the brain substance. The gross appearance was that of acute encephalitis.

It is, of course, impossible to predict how many deaths will occur in the future. If the declining ratio of severe reactions to total doses administered has any bearing, fewer deaths are to be expected. Lessening of the frequency of severe reactions connotes general improvement in technique and judgment regarding dosage as well as recognition of the need for proper storage of neoarsphenamine. It is also possible that arsphenamines and, especially, neoarsphenamines as now manufactured are less toxic than formerly. Unfortunately, it appears that such considerations have little bearing upon the frequency of fatal cases of the acute encephalitis type which was responsible for all four of the deaths which occurred in the large series of 91,707 doses of arsenical compounds under discussion.

No nonfatal reactions of this sort have been reported in the Navy. All patients who had convulsions died. Occasionally a case is described in medical literature where recovery follows after the occurrence of one or more convulsions indicative of cerebral involvement, but the outlook is not favorable in such cases even when intravenous medication with sodium thiosulphate is pushed. With regard to the four fatal cases that have occurred in the Navy since this study was begun, all followed the administration of neoarsphenamine of lot numbers which were used for large numbers of doses before and after the deaths occurred. There was plenty of evidence respecting each lot number that the drug was not toxic for thousands of other men injected. The conclusion is that the cause of death is inherent in the patient rather than in unusual toxicity of the drug. It hardly seems desirable to use the term idiosyncrasy in this connection because, in some of the fatal cases, several full-sized doses were given without evidence of ill effect before the final dose leading to the development of acute encephalitis. All deaths attributed to arsphenamine or neoarsphenamine which have occurred in the Navy since 1918 are classified below. Of 13 fatal cases of the acute encephalitis type, death followed the second dose in 9; the third dose in 1; the fifth dose in 1; the sixth dose in 1; and the eighth dose in 1. If neoarsphenamine is to be used for the treatment of syphilis in the dosage and at the intervals generally recommended by syphilographers it seems impossible to guard against an occasional case of this type. As for treatment, when symptoms indicative of cerebral involvement or, for that matter, any manifestations of acute arsenical poisoning develop, sodium thiosulphate is the only medic-

inal agent available at present that is likely to improve the patient's chances for recovery. If a convulsion has occurred sodium thiosulphate can not be expected to have any favorable effect unless it be given intravenously in large doses—1.0 gram or more every few hours.

While it is not possible to predict how many deaths will occur in the course of the next 100,000 doses administered, it is at least gratifying that no deaths other than the four attributable to encephalitis resulted from the administration of the last 91,000 doses. In previous years a few fatal cases of other types were encountered.

Figures are not available to show how many doses of arsphenamine and neoarsphenamine were administered in the Navy each year or month before December 1, 1924. Therefore, no certain comparison can be made, but there is every reason for believing that at least 2,000 more doses have been given per month since January 1, 1925, than in the average month of the preceding five years. Consequently, there is little doubt that the ratio of deaths as well as nonfatal severe reactions to numbers of doses administered has been much less than in earlier years.

At any rate, it may be noted that while the death rate from arsphenamine and neoarsphenamine poisoning has not increased in the Navy, and even appears to have decreased considerably in spite of a great increase in the number of doses administered, deaths from arsenical compounds employed in the treatment of syphilis seem to have increased steadily from year to year in the United States at large. The latter conclusion is supported by the following figures obtained from the United States Bureau of the Census, showing the number of deaths in the registration area for mortality statistics reported by years, 1914 to 1925, caused by arsphenamine, neoarsphenamine, etc.:

Deaths in the registration area of the United States following injection of specified drug in the treatment of syphilis

Name of drug	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916	1915	1914
Total.....	103	89	66	65	59	53	50	19	13	13	11	17
Arsphenamine.....	56	45	36	32	38	38	41	16	9	9	6	13
Neoarsphenamine.....	27	30	26	26	19	13	9	3	3	4	5	4
Silver arsphenamine.....	0	1	0	0	0	0	0	0	0	0	0	0
Sulpharsphenamine.....	3	6	1	0	0	0	0	0	0	0	0	0
Kind not specified.....	17	7	3	7	2	2	0	0	1	0	0	0

It is altogether probable that many more deaths from these causes have occurred in the United States. The figures as collected most likely account for a greater proportion of the deaths following immediate reactions than of those in cases where more or less delay in the onset of serious symptoms makes less obvious the connection between the administration of the drug and the fatal outcome.

Moreover, the tendency to cover up or explain deaths on other grounds than poisoning must be taken into consideration.

The term "arsphenamine," like the term "salvarsan," is loosely used by many physicians when neoarsphenamine is really meant; so it can not be taken for granted that the figures in the table indicate true relationships between deaths from arsphenamine poisoning and poisoning by neoarsphenamine.

It is probable that one or more deaths occurred in the Navy each year before the calendar year 1924 which were really caused by the administration of arsphenamine or neoarsphenamine but were not so reported. During the calendar years 1924, 1925, and 1926 care has been taken not to overlook the possibility that such deaths might be otherwise reported, especially in cases where the arsenical compound was not obviously the cause of death.

It should be said that there have been no indications that any medical officer has deliberately sought to represent any other cause as being responsible for death in cases which should be charged to poisoning by neoarsphenamine or some other arsenical compound. The system of collecting the vital statistics of the Navy, with its many checks, makes it extremely unlikely that an attempt to conceal the real cause of death could succeed.

Deaths have been reported in the Navy since 1918, by years, as follows:

Drug	1925	1924	1923	1922	1921	1920	1919
Total.....	2	3	1	4	4	2	3
Arsphenamine.....	0	1	0	0	3	1	2
Neoarsphenamine.....	2	2	1	4	1	1	0
Kind not specified.....	0	0	0	0	0	0	1

¹ No data available.

To date two deaths from poisoning by neoarsphenamine have occurred in 1926. With these included, data are available for the study of 13 fatalities resulting from the administration of neoarsphenamine and 7 from the administration of arsphenamine. The cases may be classified as follows:

	Arsphenamine	Neoarsphenamine
Acute encephalitis.....	4	9
Immediate, shock-like reaction, death in 60 minutes and 90 minutes.....	1	1
Delayed shock; death in 12 hours.....	0	1
Sudden death 45 hours after second dose; thrombosis, right ventricle and pulmonary artery.....	1	0
Acute arsenical poisoning; transverse myelitis (bulbar); three doses, amounts not stated, given in one week.....	0	1
Acute arsenical poisoning and acute mercurial poisoning; embolism, anterior tibial artery; edema of the lungs.....	0	1
Purpura hemorrhagica; hemorrhages began a few hours after second dose; death on the fifteenth day.....	1	0

It will be noted that in 13 of the 20 fatal cases poisoning was of the acute encephalitis type. The time from the injection of the final dose of the drug to the time of death in the 13 encephalitis cases was 43, 54, 64, 70, 72, 80, 80, 80, 80, 84, 87, 92, and 136 hours.

NONFATAL REACTIONS

In the course of the whole series of 91,707 doses of arsenical compounds administered, chiefly in the treatment of syphilis, there were, as indicated by the summary at the beginning of this article, 85 reactions classed as mild and 32 classed as severe. Classification is made at the United States Naval Medical School; medical officers report the circumstances and the symptoms and signs as observed. No reaction which at any time, even for a few minutes, appeared to be serious or alarming in character, has been classed as mild. The 85 mild reactions doubtless include some in which the symptoms were hardly more pronounced than the discomfort experienced by most men who received the treatment. Some of the reactions classed as mild probably were in the nature of Herxheimer reactions, if such reactions are defined as resulting from the liberation of toxic products incidental to the destruction of large numbers of *treponemata*. Some of the reactions classed as severe were also probably Herxheimer reactions.

During the first seven months of the period under review certain lot numbers of neoarsphenamine were in use which were occasionally causing very severe reactions. Furthermore, the reactions caused by different lot numbers were more or less characteristic of each. For example, the symptoms in a given case would almost enable one to say which of these lot numbers of the drug had been administered. At the same time, each of the lot numbers which was causing extremely severe reactions was also causing very mild reactions and, in many cases, no reaction. There were certain features about some of the very mild reactions caused by neoarsphenamine of a given lot number which suggested that no dividing line could be drawn between mild and severe reactions. In some instances there was the temptation to class a reaction as severe merely because the lot number in question had already a history of having caused several reactions alarming in character. Care was exercised, however, to classify each reaction according to the symptoms and signs reported, without bias.

With regard to the 32 nonfatal severe reactions, 22 occurred between December 1, 1924, and July 1, 1925; that is, in the first seven months of the period during which 24,745 doses of arsphenamine, neoarsphenamine, and other arsenical compounds were administered. These reactions were described in detail in the combined September-October, 1925, number of the *BULLETIN*; vol. 23, Nos. 3 and 4.

Since then, incidental to the administration of 66,962 doses of arsenical compounds, only 10 reactions that could properly be classed as severe were reported. The 3 fatal cases of the acute encephalitis type are not included in the 10. During the same period 44 mild reactions were recorded.

Three of the 10 severe reactions were caused by neoarsphenamine and 7 by arsphenamine.

NEOARSPHENAMINE REACTIONS

The following table shows the numbers of doses administered, incidental to which the three severe reactions occurred. The neoarsphenamine used was of various makes and lot numbers.

Neoarsphenamine

Size of dose	Number of doses	Severe and alarming reactions	Mild reactions
0.9 gram.....	35, 136	2	15
0.6 to 0.9 gram.....	14, 632	0	6
Less than 0.6 gram.....	8, 916	1	15
All.....	58, 684	3	36

Data relating to the three reactions classed as alarming were as follows:

Case I.—Lot number designated by key letter "J." The patient had syphilis in the secondary stage. He had had one 0.9 gram dose of the same lot seven days before. About 24 hours after the second dose, also 0.9 gram, the patient developed chills, vomiting, and prostration. Twelve hours later he was transferred to hospital in a state of collapse. His temperature upon admission was 95° F. He vomited frequently and his pulse was weak and rapid. For three days there were marked clouding of consciousness, disorientation, and positive Romberg sign. His face was flushed and the eyes protruded. Retention of urine required catheterization. Vomiting persisted for two days. The urine was normal. He was given caffeine citrate subcutaneously once daily and also 5 per cent glucose solution intravenously each day. Sodium thiosulphate was administered intravenously once daily for three days. Symptoms abated gradually and he was apparently normal five days after admission to hospital. Subsequently a Kahn test was negative.

The technique in this case is open to criticism. The following are contained in the standard instructions for the preparation and intravenous administration of neoarsphenamine:

18420—26—13

In marked contrast to the practice with arsphenamine, do not prepare any more solution at one time than can be administered within 20 minutes * * * and in no case, whether the gravity or syringe method is used, should more than 0.1 gram of neo-arsphenamine be injected in 30 seconds, or 0.6 in 3 minutes.

In this case the contents of eight tubes, each containing 0.9 gram of neoarsphenamine, for eight patients, were mixed and put into solution at the same time. The patient who had the severe reaction was the fifth in turn to receive his dose.

The records compiled from monthly reports of venereal diseases indicate that the lot number in question has been used in the Navy for several months. In all, several thousand doses have been administered. Besides the above described reaction, only two, both mild, have been reported as following doses of that lot number. One of the two occurred at the same station about two months later.

Case II.—Lot number designated by key letter "C." The patient had previously received three 0.9 gram doses of neoarsphenamine, lot number not stated. The fourth dose, which was followed by the severe reaction, was also 0.9 gram. About 10 minutes after the intravenous injection was completed the patient was seized with nausea and vomiting. Within a few minutes his temperature rose to 105° F. and his pulse was 124. About an hour later he complained of rheumatic pains and developed diarrhea. The urine contained a large amount of albumin and traces of albumin were found for six days. Acute symptoms subsided after 18 hours and the patient completely recovered.

There is no evidence bearing on the technique used in this case.

Neoarsphenamine of lot "C" has been used in the Navy for about a year. Besides the reaction described, 14 mild reactions have been attributed to it. It was also the lot number involved in one of the fatal cases of the acute encephalitis type. Its toxicity for rats has repeatedly been found low. Unless individual ampules have been subjected to deteriorating influences, there is no reason for believing that it is unusually toxic for human beings.

Case III.—Lot number designated by key letter "K." The dose which caused the patient's symptoms was the first he received. Immediately after the intravenous injection of 0.3 gram the patient had a chill. His temperature rose to 103° F. and remained elevated for six hours. No symptoms suggestive of shock were mentioned. The patient recovered in less than 24 hours.

Lot number "K" was released in 1923. How much has been used in the Navy is not known, but presumably a good many doses, especially in the Asiatic Fleet. Only one other reaction, mild in character, has been reported as following its use.

ARSPHENAMINE REACTIONS

The following table shows the number of doses administered during the course of which seven severe reactions occurred between July 1, 1925, and August 31, 1926:

Arsphenamine

Size of dose	Number of doses	Severe reactions	Mild reactions
0.6 gram.....	1,499	6	0
Less than 0.6 gram.....	4,728	1	8
All.....	6,227	7	8

Data relating to the seven severe reactions were as follows:

Case I.—Lot number designated by key letter "U." The patient had a primary lesion and secondary syphilitic eruption on the body at the time. The reaction followed the first dose administered—0.8 gram. One hour after the intravenous injection was completed nausea and vomiting began. The patient's temperature rose to 101° F. and his pulse to 120. He complained of faintness and general weakness. Six days later he was given a second injection without reaction. The medical officer regarded this case as a Herxheimer reaction, and it probably was. The skin eruption was intensified during the reaction.

Cases II, III, IV, V, VI, and VII were all reported by one naval hospital. These reactions all followed doses of one lot number, designated by the key letter "T." This lot number was released and placed on the market in 1920. It has been used right along in that and other naval hospitals. Between December 1, 1924, and July 1, 1925, this lot number caused one severe and two mild reactions. The six severe reactions which are being considered here are all that have followed its use since July 1, 1925. These six occurred either on June 21 or June 28, 1926. Altogether 30 patients received 0.6 gram each of this lot number on those two days. Six had severe reactions and 18 others had symptoms which ordinarily would not be regarded as severe reactions but in this instance were thought to furnish additional evidence that the drug was unusually toxic.

Regarding preparation of the patients, preparation of the drug, and method of administration, the technique was reported as identical with that followed for two years. It conformed strictly to the standard instructions for use by the medical departments of the Army, Navy, Veterans' Bureau, and United States Public Health Service.

Prior to the dates mentioned no severe reactions had occurred at that hospital from the use of arsphenamine. A few mild reactions

occurred and in practically all of those cases it was found that the patients had eaten breakfast contrary to instructions.

The medical officer considered that the severe reactions under discussion were caused by arsphenamine which had deteriorated. Neoarsphenamine was later administered to all of the patients without ill effects.

The symptoms in these cases were much the same. In case II the patient received the sixth dose of his second course of treatment. The doses were 0.6 gram given about a week apart. His reaction to the sixth dose consisted of chills, fever, nausea, vomiting, and some shock. The symptoms lasted eight hours.

In case III the patient received the fourth dose of his second course. As in case II, the reaction consisted of chills, fever, vomiting, and some shock. The symptoms lasted for 14 hours.

In case IV the patient received the seventh dose of his second course. His first course consisted of 10 doses. The symptoms were like those in the first two cases described. The reaction lasted about eight hours.

In case V the patient received the sixth dose of his first course. The reaction lasted about 20 hours. The symptoms as in the other cases were chills, fever, vomiting, and shock.

In case VI the patient received the sixth dose of his second course. The reaction lasted about 30 hours. The symptoms were chills, fever, vomiting, sharp muscular pains, and shock.

In case VII the patient received the fourth injection of his first course. The initial lesion of syphilis appeared about four weeks before he was given his fourth dose. The reaction lasted about six hours. The symptoms were chills, fever, vomiting, and some malaise.

SULPHARSPHENAMINE

Since December 1, 1924, 1,301 doses have been administered in the Navy, 753 having been given since July 1, 1925. The reports do not show how many doses were injected intravenously. No severe reactions have been reported. Serious ill effects and fatal cases of dermatitis and purpura hemorrhagica have been described by some writers.

TRYPARSAMIDE

Since December 1, 1924, 1,834 doses have been administered in the Navy. Of these, 1,303 have been administered since July 1, 1925. No severe reactions have been reported.

Toxic phenomena have been observed to follow its administration in the treatment of syphilis. Visual disturbances produced by tryparsamide are discussed in an article by Alan C. Woods, M. D., and

Joseph E. Moore, M. D., of Baltimore, which appeared in the *Journal of the American Medical Association*, June 23, 1924 (Vol. 82, No. 26).

AGE AND KEEPING QUALITIES OF ARSPHENAMINE AND NEOARSPHENAMINE

In general, arspenamine may be expected not to deteriorate with age under ordinary conditions of storage. It has been found in the United States Hygienic Laboratory that samples of most old lots of arspenamine upon retest were no more toxic for rats than when first examined. This statement applies to lots 6 years old. Certain lots more than 10 years old have shown no increase in toxicity for rats. While the samples were not kept in cold storage, the storage facilities at the laboratory were good.

There is not sufficient evidence as to whether the therapeutic activity of arspenamine is lowered by keeping it for several years, but there is no reason to believe that it is lowered.

Although arspenamine is comparatively stable, it is desirable not to store it in hot places. On board ship it may be kept in cold storage.

It is not unlikely that arspenamine of better quality is being manufactured now than a few years ago. Everything considered, it would appear preferable not to administer arspenamine that is more than three years old. Practically all severe reactions which have followed the administration of arspenamine in the Navy in recent months have been caused by arspenamine released and first offered for sale in 1919 and 1920.

Neoarsphenamine is liable to deteriorate with age, particularly when kept at too high a temperature. Experimental evidence as to the effect of light is lacking. Some makes of neoarsphenamine are more apt to deteriorate than others, and there are also variations respecting keeping qualities with different lot numbers of the same make. This has long been recognized at the United States Hygienic Laboratory, and the question of putting a time limit or expiration date on each lot has been carefully considered. Such action has not been taken because deterioration must be regarded as a more or less accidental occurrence, in that at least 90 per cent of all samples of neoarsphenamine, under ordinary storage conditions, remain stable for at least two years, during which time it is reasonable to suppose that the material sold will be used. Furthermore, it has been found that neoarsphenamine when it does deteriorate is apt to do so within a few months. Early expiration dating that would take care of this contingency would practically prohibit the use of the drug.

Consequently, the only way to safeguard the patient lies in the careful observation and inspection of every ampule used by the

physician immediately before it is administered. Inspection should take into consideration color change and appearance of the powder. The powder should completely dissolve. Only one or two ampules in a carton may show physical evidence of deterioration. That is, only one ampule in a carton may be unfit for use, so far as can be judged by inspection of the powder and solution prepared with it.

Neoarsphenamine showing gross evidence of deterioration often shows almost complete loss of therapeutic activity. It is reasonable to suppose that anything short of gross deterioration also involves some loss in therapeutic activity.

In view of the above, it appears preferable not to administer neoarsphenamine that is more than two years old. Medical officers who are in doubt as to the age of arsphenamine or neoarsphenamine they are using may write to the Bureau of Medicine and Surgery stating the name of the manufacturer and the lot number of the product.

TOLERANCE FOR ARSPHENAMINE AND NEOARSPHENAMINE

While this article does not deal with the treatment of syphilis, it may be observed that overdosage not infrequently causes ill effects. Irrespective of reasons for avoiding undertreatment, a patient should not be given more arsphenamine or neoarsphenamine in a given period of time than he can tolerate. Different individuals appear to vary a great deal with regard to tolerance. The result of exceeding tolerance may be acute, subacute, or chronic arsenical poisoning. Some of the cases reported as severe reactions have appeared to be cases of arsenical poisoning rather than reactions resulting from any special toxic action of any single dose administered. The manifestations in some cases are those resulting from damage to the liver or kidneys. In other cases exfoliative dermatitis is a result. It is generally recognized that the skin is likely to give the earliest indications that the patient's tolerance has been exceeded. Unfortunately, it may not. Whatever the signs may be they should be heeded.

The following is the case of a man who was given a large amount of neoarsphenamine in a few weeks. Probably many other men have received as much without serious results, but it can not be expected that such large amounts can be given routinely at weekly intervals for many doses without poisoning some patients.

The patient, a seaman, first class, 25 years old, was admitted to the sick list on board ship with syphilis February 10, 1926, and treatment for the disease apparently began about that time. The case was reported by the U. S. S. *Relief* to which he was transferred after the manifestations to be described had appeared. A note in his health record dated April 1, 1926, indicated that he had received

eight 0.9-gram doses of neoarsphenamine in 49 days. He also received 16 inunctions of mercury during that period. Upon admission to the hospital ship April 18, 1926, his temperature was 103° F., pulse 92, and respirations 20. There were exfoliating and pustular lesions extending over the entire body except the palms of the hands and soles of the feet. The skin of the face and torso was fissured and serum was exuding copiously. The eyes were greatly inflamed, and the ears were swollen, cracked, and painful. The urine showed a slight trace of albumin. Nonprotein nitrogen was 0.028 per 100 cubic centimeters. A blood Wassermann test was negative. The history showed that he never had had a positive complement fixation test. The diagnosis in the beginning was made from a smear examined by dark field illumination. The white blood count was 14,800. A few days after admission the palms of the hands and the soles of the feet became involved.

His health record indicated that a slight erythematous eruption had first appeared on his neck about April 8, 10 days before he was transferred. The eruption was itchy and gradually spread over the face, arms, body, and legs. In a few days the skin began to scale, and itching was superseded by a feeling of constriction.

Treatment consisted of intravenous injections of sodium thiosulphate daily, beginning with 0.5 gram. The doses were rapidly increased to 1.5 grams and continued for 12 days. Daily tub baths were also given. The report stated that the patient, after a stormy time, convalesced. The skin on the head, arms, body, and legs exfoliated at least three times. Skin came off from the palms of the hands and soles of the feet in large pieces. The fingers and toenails were shed, and practically all the hair was lost. For some time the systolic blood pressure was 90, with a diastolic pressure of 45. The legs were edematous, but there was little kidney disturbance as demonstrated by urinary and blood findings. Other than the skin lesions, the symptoms and signs were cardiovascular. June 26, 1926, the skin was practically normal but the blood pressure was still low—100 over 75.

**REPORT OF AN OUTBREAK OF FOOD POISONING ON BOARD U. S. S.
"CONCORD," MAY 13, 1926**

By R. H. COLLINS, Lieutenant Commander, Medical Corps, United States Navy

May 13, 1926, while the U. S. S. *Concord* was alongside the dock at the navy yard, Philadelphia, Pa., an epidemic of acute food poisoning occurred, affecting 124 men. The conditions and circumstances were as follows:

The stay in the home yard being considered a leave and liberty period, approximately one-third of the crew of 502 men were on

leave, and of the remaining two-thirds approximately one-third were given liberty daily from 4.30 p. m. until 8 a. m. the following day. The character of work being performed was limited to general ship's routine, for the purposes of upkeep of equipment and to maintain cleanliness.

There are six messes aboard ship, and the food for each is prepared in the one galley—a compartment approximately 15 feet wide by 35 feet long. Each mess has its own cook and cooking utensils, and the only article of food used in common by all is the water, which at this time was Philadelphia city water.

The epidemic was limited to the general mess and to members of the crew who ate breakfast on board May 13. Breakfast was served at 7.30 a. m.

Menus for the general mess May 12 and breakfast May 13 are as follows:

May 12

BREAKFAST	DINNER	SUPPER
Fresh fruit (bananas).	Chicken soup.	Cold luncheon meat.
Baked beans.	Roast chicken.	Vegetable salad.
French toast.	Creamed asparagus.	Cold beans.
Bread, butter, coffee.	Giblet gravy.	Sliced cheese.
	Mashed potatoes.	Bread, butter, coffee.
	Ice cream.	
	Bread and coffee.	

May 13

Fresh fruit (oranges).
 Fresh beef hash (fresh beef, onions, potatoes).
 Bread, butter, coffee.
 Tomato catsup (California Conserving Co.).

The onset of symptoms was sudden, occurring within from two and one-half to three and one-half hours after breakfast. The symptoms were nausea, vomiting, purging, severe abdominal cramps, and general muscular cramps, especially in the calves of the legs. The patients most severely affected had blood in the vomitus and in the stools, and in such cases there was marked circulatory collapse.

At the expiration of 24 hours approximately 75 per cent of the attacked had returned to duty. All but three of the others were able to return to duty within three days. There were no deaths.

The poisoning was undoubtedly caused by food served at breakfast May 13, 1926. Of 193 men who ate breakfast on board that morning, 143 ate hash. Fifty men did not eat any of the hash and none of those men was sick. Of the 143 who did eat hash, 124 had symptoms of food poisoning and 19 experienced no ill effects.

U. S. 124 men who were poisoned partook of other articles of food. Leaf follows: 67 ate catsup, 92 drank coffee, 91 ate fruit, 101 ate ~~wat~~ard, and 28 drank milk. The 50 men who did not eat hash and the 19 who did without being made sick also partook of other articles of food served at the meal. The hash was undoubtedly the cause of poisoning.

The hash was composed of ground cooked beef, potatoes, onions, salt, pepper, and water. The potatoes and onions were peeled by hand Wednesday afternoon, May 12, carried to the galley where they were washed, immersed in cold fresh water, and allowed to stand overnight. The next morning the potatoes were washed again, placed in a steaming kettle and cooked. The meat was taken from one hind quarter of beef which had been received from U. S. S. *Memphis* at Guantanamo Bay, Cuba, about the 23d of April. It had been kept frozen in cold storage on board the *Concord*. The quarter of beef was removed from cold storage on the morning of May 12 and a sufficient quantity of meat to make the hash was cut from it. The meat for the hash was put in a metal pan and placed in the chill room where the temperature was 38° F. It was kept there until 4 p. m., when it was taken to the galley and cooked in a steam kettle. After the meat had been thoroughly cooked and allowed to cool so that it could be handled, it was passed through the meat grinder, packed in two large iron cooking pans and replaced in the chill room, where it was kept until the following morning. About 4 a. m. the ground meat was removed from the chill room and carried to the galley, where it was mixed with the potatoes and onions, placed in five large iron pans and put in the oven to bake. The first pan of hash was taken from the oven about 7 a. m., and the last pan at about 7.35 a. m. It was established that hash served from all of the pans made men sick.

The vegetables used in the hash were fresh, prepared in a cleanly manner, and the potatoes were freshly cooked. It seemed reasonable to eliminate all the ingredients of the hash as possible sources of poison except the meat. All available specimens of foods served at the suspected meal, including a sample of the uncooked beef used to make the hash, and also vomitus and stools from some of the patients were collected and sent to the United States Naval Hospital, League Island, Pa., for analysis.

According to the laboratory report, a large Gram positive anaerobic bacillus, which was considered to be *B. putrefaciens*, was cultured from two specimens of meat juice, from pieces of the ground meat, from the vomitus of a patient, from a sample of the hash, and from a diarrheal stool. The bacilli, which showed spore formation but no capsules, were from 5 to 10 microns in length and some were 20. The microorganism did not grow aerobically.

No bacillus belonging to the Gärtner or meat-p. The were as lay. of that group were present they would have been recovered. breip's medium was used and no such bacillus grew.

A sample of feces from the ship's cook who handled and prepared the meat for the hash was also cultured. It was concluded that he was not a carrier of any microorganism that might have been the causative agent of the outbreak.

The laboratory findings did not preclude the possibility that the meat became contaminated at the time of grinding. Bacilli could have incubated during the night, especially near the center of the mass of meat, which naturally would be slow in cooling. Toxin capable of causing the poisoning could have been produced, the bacilli themselves being killed when the hash was cooked in the morning, so that none was left to be detected by culture, the heat resisting toxin nevertheless being left active. The fact that no microorganism having the characteristics of *B. aertrycke* or *B. enteritidis* was demonstrated in the laboratory cultures does not necessarily exclude those organisms as a possible cause of the poisoning, for it seems doubtful that any nonspore-bearing organism could survive the two processes of cooking to which the meat of the hash was subjected.

In an effort to determine whether or not the meat prior to being cooked was fit for human consumption, an inspector from the Bureau of Animal Industry was called in to assist in the investigation. He examined all of the meat in the ice box, including the remainder of the questionable quarter, and pronounced it all in good condition so far as observation could determine. He also ate several particles of the raw beef which was cut up for the hash and kept in the same container under identical conditions with the specimens submitted to the laboratory, in which the *B. putrefaciens* was found. No ill effects were experienced from the ingestion of this raw meat. It is true that the particles of raw meat eaten by the inspector were not subjected to the heat and then allowed to cool in the chill room, as was that which was used in the hash, but it is known that *B. putrefaciens* was present in this meat and with a temperature of not below 38° F., and in the presence of a considerable amount of meat juice, it is possible that sufficient toxin could have been formed to produce some degree of illness. The finding of the *B. putrefaciens* in the vomitus and stool of several of the men who were ill does not necessarily mean that this organism was responsible for the poisoning.

Owing to the limited space aboard this type of ship, approximately 70 patients were given emergency treatment aboard the

U. S. S. *Mercy*, and in all 90 patients were transferred to the League Island Hospital. Copious drafts of sodium-bicarbonate water were used to cleanse the stomach and when vomiting quieted down black coffee was given for its stimulating effect. Morphine and atropine, with ammonia inhalations, had to be used in the most severe cases. The clinical description of cases as required by Bureau of Medicine and Surgery's questionnaire is as follows:

(a) Abdominal cramps were the first indication of illness and these were closely followed by vomiting and prostration.

(b) The onset was very sudden; several men collapsed at their stations.

(c) There had been no previous disease or symptoms.

(d) Could not have been a relapse or recurrence of any other disorder.

(e) Most cases were seen within from 5 to 15 minutes after the illness began.

(f) Complexion pale, and prostration and pain were evident.

(g) Pain was evidently continuous, but severe spasms of pain occurred frequently.

(h) There was persistent vomiting for approximately one hour and in many cases for as long as five hours.

(i) There were purging, tenesmus, much flatus, and bloody stools.

(j) Diarrhea was common to all cases. At first the stools were watery and yellow, but later they showed visible signs of blood.

(k) Chills were common from one to three hours after onset.

(l) The temperature at first was subnormal but in several of the most severe cases the temperature reached 100° F. by the second day.

(m) There was a general cramping of the muscles of the trunk and extremities, and in some cases muscular soreness was noted.

(n) Some patients complained of severe frontal headache.

(o) Prostration was marked in all cases and was very sudden in onset.

(p) The mouth was dry, due probably to the depletion of body fluids. Most of the patients craved water.

(q) No ocular symptoms were noted, except that the pupils were markedly dilated in two very severe cases.

(r) A marked pallor was evident in all cases during the early stage. Several patients became cyanotic as a result of circulatory collapse.

(s) The pulse was feeble and the rate rapid. Blood pressure not taken.

(t) Respirations were shallow, rapid, and irregular. Rate not recorded.

(u) There were no skin eruptions.

During the course of the investigation special efforts were made to determine the possibility of some chemical substance, such as oxalic acid or sodium fluoride which might have been used by the cooks for cleaning gear or to exterminate insects, being mistaken for sugar or flour and used in preparing the food. This possibility was ruled out, as no evidence could be obtained to indicate that any such chemical was ever used about the galley.

The conclusions reached were that the food poisoning was caused by hash served for breakfast on the morning of May 13, 1926; that the meat was probably contaminated while being ground and the organism incubated during the time the ground cooked meat was kept overnight in the chill room, liberating a very potent toxin which produced the illness. The exact type of organism is questionable but it was undoubtedly one of the members of the food-poisoning group—*B. aertrycke*, *B. enteritidis* (Gärtner).

In closing this report it is very gratifying to invite attention to the splendid cooperation rendered by the U. S. S. *Mercy* and the League Island Naval Hospital; for without their assistance extreme difficulty would have been encountered in properly caring for the large number of sick.

REPORT OF AN OUTBREAK OF FOOD POISONING FOLLOWING A BARBECUE

By Lieut. Commander R. L. NATTKEMPER and Lieut. Commander H. S. SUMERLIN, Medical Corps, United States Navy

There were admitted to the United States Naval Hospital, San Diego, Calif., during the month of September 87 cases of food poisoning within a period of eight hours.

One of the local beach resorts gave as complimentary to service personnel what they termed a free barbecue. At this affair cold roast-beef sandwiches and near beer were served. There were approximately 500 served. A total number of 175 cases of food poisoning resulted. The patients were from different military units. Twenty cases developed among civilians who had attended the affair. Every patient had eaten one or more of the cold roast-beef sandwiches. Many had not drunk any of the beer.

The number of sandwiches eaten by each person had no apparent relation to the severity of symptoms. In no case was there any abnormality of the food noted at the time it was served. All who ate it considered it very palatable.

The portion of beef served was that called "chuck." It was obtained from a large local packing plant of the city. The meat had never been frozen but was only chilled. It was cold and apparently in good condition when delivered. Within an hour after delivery the meat was placed in three large pans and then slowly roasted for a

period of five hours. It was then placed in large iron pans, covered over with cloth, and left standing at kitchen temperature for a period of 20 hours, at which time it was served. The gravy was drained from the pans when removed from the oven and placed in a large galvanized pot. Just before serving it was brought to boil. When served the meat was cut in small pieces, dipped in hot gravy, and then placed in buns. This meat was prepared in a large modern commercial kitchen. Inspection showed methods and surroundings clean and sanitary.

Symptoms developed from 15 to 24 hours after ingestion of the food; most cases at approximately 18 hours. There was no uniformity as to mode of onset. Many first noted malaise and chills, others abdominal cramping, while in others headache was the first symptom. The onset was abrupt, each patient being able to state definitely the hour of taking sick.

The outstanding clinical features were as follows:

1. *Temperatures*.—In a few cases at the onset there was a mild state of shock with subnormal temperature, after which the temperature rapidly rose, in some cases to as high as 105° F. In the majority of cases the temperature was between 102° and 103° F.

2. *Pulse*.—The pulse was full and bounding, with rates varying from 95 to 120. No arrhythmia.

3. *Dehydration*.—Skin typically dry and hot, face flushed. Cramps in lumbar, leg, and thigh muscles. Urine concentrated and decreased in amount.

4. *Eyes*.—Pupils equal, regular, reacted to light, but were markedly dilated. No double vision or ocular palmar.

5. *Abdomen*.—Abdomen soft, not distended, but on palpation general soreness present. Severe cramping present, with frequent stools passed with sense of relief. Stools watery, greenish, foul smelling, with flecks of mucus, and occasionally blood streaked.

6. *Vomiting*.—Prominent symptom, vomitus liquid, greenish and frothy in appearance. No blood present.

7. *Headache*.—Frontal and occipital. In many cases it was the major complaint.

8. *Prostration*.—Marked prostration and weakness present in all cases.

9. *Mental and neurological symptoms*.—The general tendency was toward somnolence, but no patient developed coma. One man was confused and showed emotional disturbance, but he had a neurotic background. No abnormal neurological findings.

TREATMENT

Gastric lavage with warm sodium bicarbonate solution until vomiting stopped. Catharsis with magnesium sulphate or castor

oil. Forcing of fluids by mouth. Opiates were used in a few cases for headache and severe abdominal pains. The immediate subsequent treatment was directed to overcoming the dehydration which was a prominent feature. Diet was restricted to thin soups and albumin water until the temperature had been normal for 24 hours, then soft diet was ordered for a few days longer.

All patients were apparently well within 48 hours to 6 days, and no complications occurred.

The following laboratory procedures were carried out:

For the purpose of bacteriological investigation the clinical laboratory received 16 specimens of feces. Five blood cultures were made and blood serum was collected from 12 patients. An effort was made to obtain specimens of the meat served for cultural purposes, but all remaining had been destroyed. Chemical and microscopical examinations of the urine were made in each case. Blood counts were made in a number of cases. The feces were from the more severe cases. They consisted of a greenish, foul-smelling fluid, containing flecks of mucus, and in a number of instances flecks of blood. These were plated on Endo's medium. All plates showed pale blue colonies and several were almost pure cultures. These colonies were Gram-negative motile bacilli, which formed acid and gas in maltose, glucose, and mannite, and caused no change in lactose and saccharose. This identified them as being in the paratyphosus enteritidis group.

Agglutination reactions were then carried out, using the sera from 12 patients picked at random. These were obtained on the eighth day after the onset of symptoms. Serum obtained from a recruit who had been inoculated with typhoid vaccine two months previously was used as a control. The sera were used against the bacillus recovered from the feces, against *B. enteritidis*, *B. paratyphosus A*, and *B. paratyphosus B*. Macroscopic agglutinations were done. The results are shown in the table presented below. The positive reactions with *B. enteritidis* and the bacillus recovered from the feces, and the negative results with Para A and B identify the organism in question as *B. enteritidis*.

The blood cultures were taken from five of the patients most severely affected 24 hours after the onset of symptoms. All were negative.

In the urinalysis, acetone was present in a number of cases. This was the only positive finding. Several specimens from severe cases were received for culture on the third day of the disease. These were negative for bacilli of the Gärtner group.

The blood counts were taken on the second day and showed very little change from normal. The erythrocytes and hemoglobin were normal. The leucocytes ranged from 7,000 to 10,000. The neutro-

philes were slightly increased in most cases, ranging from 60 to 82 per cent. The average was 74 per cent.

Serum dilutions.	Bacillus from feces					B. enteritidis			Para A		Para B	
	1-20	1-40	1-80	1-160	1-320	1-20	1-40	1-80	1-20	1-40	1-20	1-40
1.....	++++	++++	+	-	-	++++	+	-	-	-	-	-
2.....	+++	+++	-	-	-	++	-	-	-	-	-	-
3.....	++++	++++	+	-	-	++	-	-	-	-	-	-
4.....	++++	++++	+++	+	-	++++	++++	+++	-	-	-	-
5.....	++++	++++	++	-	-	+	-	-	-	-	-	-
6.....	++++	++++	++	-	-	+++	-	-	-	-	-	-
7.....	++++	++++	+++	-	-	++++	++++	++	-	-	-	-
8.....	++++	++++	+	-	-	++++	++	-	-	-	-	-
9.....	-	-	-	-	-	++	-	-	-	-	-	-
10.....	+++	++	-	-	-	++	-	-	-	-	-	-
11.....	++++	+++	-	-	-	++++	+++	-	-	-	-	-
12.....	++++	++++	++++	+++	+	++++	++++	++	-	-	-	-
Control.....	-	-	-	-	-	-	-	-	-	-	-	-

Investigation by the city health officer, San Diego, Calif.—The city health officer, Dr. A. M. Lesem, was informed of the facts and findings by the commanding officer of the United States naval hospital, San Diego, Calif. Doctor Lesem expressed appreciation of the cooperation in establishing the cause of the outbreak and reported the results of investigation by the health department.

It appeared that a beach café served barbecued beef sandwiches on buns and "East Side" near beer to service men only. Between eight and nine hundred men were served, of whom, according to the records of the naval hospital, 150 suffered from acute food poisoning. The meal was served from 3 to 6 p. m., Saturday, September 4, 1926.

The meat, which consisted of 315 pounds of boned chuck, was obtained from a local packer who is slaughtering and operating under Government meat inspection. It was prepared on Friday by the chef of the café. It was placed in the oven at 2 p. m. in regular bake pans and was taken out of the oven at about 8 p. m. The meat was then placed on tables, covered over with cloth, and allowed to cool. The gravy consisted of natural meat gravy to which was added nothing but water, salt, and paprika. The gravy was stored in a large granite stock pot. It was warmed over just prior to serving the next day. The chef ate some of the meat and was not made ill, but four other employees who partook of the food reported sick with symptoms similar to those reported by the enlisted men of the Navy.

Dr. H. A. Thompson, city bacteriologist, reported that the bread and beer showed nothing abnormal but that the meat had a sour odor and showed evidence of beginning decomposition. Cultures for *B. enteritidis* were negative. The physical indications of spoilage were

not significant in view of the fact that the sample was not examined until Tuesday, Sunday and Monday (Labor Day) having intervened.

A survey of the kitchen showed everything to be clean, sanitary, and operated in accordance with the city food ordinance. There was no evidence of rats, but the chef stated that a few mice had been caught and that some cockroaches were present. No roaches or mice were found at the time of inspection.

Report by the medical officer, United States naval training station, San Diego, Calif.—In submitting the questionnaire form forwarded by the Bureau of Medicine and Surgery upon receipt of Form F cards reporting the cases, the senior medical officer of the United States naval training station, San Diego, Calif., referred to the fact that a report would be submitted by the naval hospital and included such information as he possessed. Eighty men in all reported at the sick bay on the training station with definite symptoms of food poisoning. He thought it probable that a larger number were affected. These men had either "stuck it out" or their symptoms were milder than those of the men reporting for treatment. Several of the civilian employees at the "barbecue" were also affected but of course did not come under his observation. Meals served at the training station were not considered a factor as no men other than those who attended the "barbecue" and partook of the sandwiches were affected.

The so-called barbecue was given at Mission Beach by the ownership as a welcome to the returning fleet. Apparently all men in uniform were welcome to attend. Beef sandwiches were served from 2.30 to 6 p. m., Saturday, September 4, 1926.

The incubation period was variable. Most of the men could only state that they began to feel sick sometime during the night. "The closest approach to a definite time would be about eight hours." The first patient reported at the sick bay about 3 p. m. on Sunday. He stated that his symptoms began about 1 or 2 a. m. that day. When seen he was obviously in great distress and severely shocked. He was suffering with spasmodic abdominal cramps, nausea, intermittent vomiting, slight distention of the abdomen, profuse watery diarrhea, and marked prostration. He had no headache. His temperature was 104° F. His pulse was slow in relation to his temperature and a similar relationship was noted in most of the cases subsequently observed.

Urgent and immediate demands were made upon the personnel at the dispensary by the arrival of more patients in rapid succession. As the gravity of the situation was appreciated shortly after admission of the first patient, all were immediately transferred to hospital.

**REGARDING AN OUTBREAK OF FOOD POISONING AT MARINE BARRACKS,
NAVY YARD, PHILADELPHIA, PA., MAY 21, 1926**

The circumstances incident to the outbreak were inquired into by a board of investigation. The record of proceedings of the board does not lend itself to the purposes of analytical or epidemiological study as well as a properly prepared epidemiological report covering a well-planned investigation from a more strictly scientific viewpoint. Study of the outbreak apparently was not made in such a manner as to permit the presentation of any more conclusive evidence than that furnished by the legal proceedings.

In the opinion of the board the poisoning was caused by sodium fluoride introduced into bread made in the barracks kitchen. The board was of opinion that an unknown quantity of insecticide powder (sodium fluoride) became mixed up with flour used in the kitchen and that it became mixed up with the flour in some unknown manner. It seemed that not all of the bread was affected.

While sodium fluoride when ingested in considerable quantities may cause symptoms of poisoning, it seems more likely, so far as can be judged by the evidence recorded, that the cause of the outbreak was bacterial toxin produced by microorganisms belonging to the food-poisoning group.

In reaching its opinion the board apparently gave little consideration to the testimony of a United States food and drug inspector who apparently brought some practical knowledge to bear upon the conditions and circumstances surrounding the outbreak. He testified as follows:

Question. Has your occupation recently brought you in contact with the conditions in the mess hall at the marine barracks?

Answer. Yes; it has.

Question. Please explain in what way.

Answer. Attention was directed toward it by the account which appeared in the Philadelphia Public Ledger on the morning of May 24, 1926.

Question. Just what did you do as a result?

Answer. I visited the mess hall and questioned the mess sergeant and Lieutenant Orr, the mess officer. It may be well to state that we are primarily interested in establishing whether or not the poisoning is due to canned goods or other food products which may be found in interstate commerce. In other words, if we happen to trace the poisoning to a particular brand of canned goods, it is the duty of our department to investigate the source of this produce and attempt if possible to prevent food poisoning in whatever locality this particular brand of canned goods is offered for sale. We are, therefore, more particularly interested in the kinds and amount served rather than the sanitary conditions under which they are served. I was supplied with the menus for the entire week, including the days leading up to the onset of the poisoning and two days following. My suspicion was aroused toward the vegetable salad which was served at the evening meal, May 20. This salad was composed

of canned beets, canned beans, canned peas, and fresh onions. We are always suspicious of canned beans as they have in a number of cases caused very serious food poisoning, many of which resulted in death. Canned beans and beets are subject to what is commonly known in the trade as flat sour. These cans, while appearing to be normal, may have undergone a process of decomposition due to underprocess. In view of this, samples were collected representing all the vegetables above mentioned. In addition to these, six cans of jam which all showed marked indications of swelling were forwarded to our microlaboratory at Washington, D. C.

Examined by the board:

Question. Do you know what poison is usually found in beans and beets?

Answer. I don't know.

Question. How long does it take for the symptoms to appear?

Answer. Usually one to three hours after eating. From eating spoiled canned beans the symptoms may appear from 10 to 12 hours after eating.

Question. Has your investigation led you to form any opinion in regard to what caused this poisoning?

Answer. None whatever.

Question. Did you know that roach powder had been used?

Answer. I did.

Question. Did you investigate that?

Answer. I was told that it consisted of sodium fluoride, and I understand that this is not poisonous unless given in quite large doses, more than would accumulate in any food served in this mess hall. In other words, I don't believe there was enough used in the mess hall to cause this condition.

Question. What leads you to the opinion that sodium fluoride is not poisonous?

Answer. I understand that the Department of Agriculture has recommended it as an unpoisonous roach exterminator.

Question. Do you think this statement is embodied in pamphlets issued by the Government?

Answer. It is, to the best of my knowledge.

Question. If it is possible, would you submit to the board copies of these pamphlets for their information?

Answer. If it is possible, I will do so immediately.

None of the parties to the investigation desired further to examine this witness.

The board informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the investigation which he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly warned and withdrew.

The board then, at 10.55 a. m., adjourned until 8.35 a. m., Monday, June 14, 1926.

According to the proceedings of the board the following facts were established:

FINDING OF FACTS

1. The board finds that on May 20, 1926, several cases of food poisoning to the personnel were reported at sick quarters at the marine barracks, navy yard, Philadelphia, Pa.

2. The number of cases of food poisoning, as reported by sick quarters, continued to increase until 72 members of the command were affected.

3. The medical officer at the navy-yard dispensary was informed of the cases of food poisoning and assumed charge at 8.30 a. m., May 21, 1926, aiding Dr. I. Levin, Lieutenant (junior grade), Medical Corps, United States Navy, officer of the day at sick quarters at that time.

4. At about 8.30 a. m., May 21, 1926, the medical officer reported 11 cases of food poisoning; and during that day this number was augmented until 40 men were affected and taken to the naval hospital at League Island, 20 more being sent to the hospital the following day.

5. No further evidence of nor cases of food poisoning occurred after May 22, 1926, all members of the command so affected having reported to sick quarters for treatment and observation, and having been placed on the sick list or taken to the naval hospital by that date.

6. The symptoms produced in each case were the same, and consisted of diarrhea, vomiting, rise of bodily temperature, severe abdominal cramps, and indications of collapse or shock.

7. The officer of the day on duty at the marine barracks, navy yard, Philadelphia, Pa., personally inspected the food served in the mess hall on May 20, 1926, as per instructions embodied in orders issued for guidance in the performance of said duty, and reported that he was satisfied in every respect that the food was well cooked, well served, and well prepared.

8. Due to the large number of enlisted personnel which is messed at the marine barracks, at each meal it is necessary to have a first and a second mess; and personnel from the Twentieth Company, the Sixteenth Company, the Forty-third Company, the barracks detachment, and from the schools detachment are so messed.

9. Samples of both messes at the evening meal were sent to the laboratory at the naval hospital for examination, together with samples of all raw materials used in preparing the meals, nothing unusual being discovered by said laboratory examinations.

10. Samples of food products used in the mess hall of the canned type were sent to the microbiological department of the Department of Agriculture at Washington, D. C., reports of these analyses being appended, marked "Exhibit 6," (1) to (7), inclusive.

11. It was discovered from careful investigation that personnel who had eaten meals at both the first and second messes, or who had eaten but a part of the food served, or who had eaten but one, two, or three of the meals, and who were members of all of the various companies and detachments of the command messed at the marine barracks, were in a like manner and to about an equal degree affected by the food poisoning.

12. The number of men messed in the mess hall on May 20, 1926, at each meal formation was approximately 600, of which 72 were affected with the poisoning, or a percentage of 12 per cent.

13. Statements were submitted by victims of the poisoning to the number of 18, a like number, approximately, being submitted by each company and detachment messed, said statements being appended, marked "Exhibit 2," (1) to (9), inclusive.

14. The following personnel suffered from the effects of food poisoning. (See Exhibit 5.)

15. None of the cases of poisoning proved fatal, and in no one case did any one affected fail to avail himself of the immediate aid offered by the medical department.

16. The board finds that due precautions are taken by the mess officer, mess sergeant, and those concerned to see that no food of any nature is served or prepared which shows signs of putrefaction, or is unfit to be eaten, especially so in the cases of canned food.

17. All utensils of every kind are carefully cleaned after each meal, and the mess hall and the bakeshop are at all times kept in a clean and orderly condition.

18. Bread for the command is baked fresh each day and used not later than the day following, bread once having been baked being kept covered and isolated until its consumption the following day.

19. The board further finds that a roach exterminator, consisting almost entirely of sodium fluoride (analysis of this powder embodied in the navy yard chemist's report appended marked "Exhibit 4") and resembling a fine, flourlike substance, has been used in the mess hall and bakeshop by a civilian under contract to rid these places of such insects.

20. The insecticide used in the mess hall is sprayed on the walls and floors after due caution is taken to see that all food and foodstuffs are properly covered, and those in charge are instructed as to the way in which they should clean the powder from all machinery, utensils, and dishes not in use: powder blowers are used in applying this powder around the mess hall and bakeshop, after which a "touch up" or second small portion of the powder is sprayed about some few days later.

21. Experienced men, under the direction of an overseer, are intrusted with the use of this roach exterminator, and take pains to see that any unused portion of the insecticide is removed.

22. The last application of the insecticide in the mess hall and bakeshop was on the night of the 15th of May, 1926, four days before the reported cases of food poisoning.

23. The board finally finds that the insecticide used in the mess hall and bakeshop, if taken internally in the correct amounts, could produce the symptoms of food poisoning which were evident in the cases of food poisoning which occurred at the marine barracks, navy yard, Philadelphia, Pa.

OPINION OF THE BOARD

1. The board, after due deliberation, careful investigation, and examination of all reports and analyses, is of the opinion that in some manner unknown to the board, an unknown quantity of the insecticide powder became mixed up with the flour and was thus introduced into the bread, a small amount, probably, as it seems that not all the bread was so affected.

2. The board is of this opinion regardless of the fact that apparently due precautions are taken to prevent the introduction of any of this insecticide into any food or raw material used in the preparation of foodstuffs in the mess hall and bakeshop, and in spite of the fact that it was stated by the civilian under contract using this powder that unused portions are removed and that the insecticide taken internally would produce only diarrhea.

3. It is further the opinion of the board, derived from careful examinations of statements submitted by the victims, from the various food and chemical analyses, from investigation of the conditions existing in the mess hall and bakeshop, and from the evidence offered before the board, that the cause of the poisoning can not be laid on any one particular item on the menu except as noted in paragraph 1 of the opinion of the board.

INFLUENZA IN GUAM

Influenza appeared among the natives of Guam toward the end of July, 1926. The disease rapidly became epidemic. The attack rate was very high. It was estimated that cases occurred in virtually every household. A few cases were complicated with pneumonia, but, according to the epidemiological report of the outbreak, the mortality was nil. All patients treated for pneumonia in hospital recovered.

The disease manifested itself by a feeling of malaise and prostration, with an associated fever ranging from 101 to 104° F. The febrile period was from three to five days in most cases. Convalescence, as a rule, was rapid. In many cases tonsillitis and bronchitis developed. Comparatively few of the cases were treated in hospital.

Similar cases had occurred in the southern end of the island in April, May, and June. It was thought possible that a religious procession on Corpus Christi day was responsible for the introduction of the disease into the more populous sections of Agana and adjacent towns.

The habits of the natives in closing their houses tightly at night and sleeping in crowded rooms were mentioned as possible factors making for rapid spread of the disease.

The epidemic completely subsided during the course of the following month.

A wave of influenza more severe than influenza outbreaks which have occurred in other years since 1920 passed over the United States in the late winter and spring of 1926. A statistical study of these recent epidemics was published by the office of statistical investigations, United States Public Health Service, in Public Health Reports, August 20, 1926. The excess of deaths in many cities from which the United States Bureau of the Census receives weekly reports was quite great during the epidemic period. In the study referred to it was stated that, were it not for the overshadowing pandemic of 1918, which caused over 500,000 deaths in the United States alone, and the epidemic of 1920, which caused about 100,000 deaths in this country, the 1926 outbreak would have been regarded as a calamity. The peak of the epidemic appears to have been reached in January in California and in March in Oregon, but doubtless cases from which the epidemic strain of virus could have been transferred to other parts of the world continued to occur throughout the spring. In the New England States the peak of mortality was reached about the middle of March, and likewise in the Middle Atlantic States.

THE EFFICACY OF B. TYPHOSUS VACCINE IN CONTROLLING TYPHOID FEVER IN GUAM

The following paragraph is taken from the Annual Report of the Governor of Guam, 1926:

Typhoid fever.—During July and August, 1925, this disease was quite prevalent, although only the native population was affected. Because each case of typhoid meant a long period in the hospital it was believed that it would be of economic advantage to vaccinate the entire population of the island with typhoid prophylactic. The Bureau of Medicine and Surgery approved the requisition for the prophylactic, and every inhabitant of the island of 3 years of age and over was given a complete course of three injections of the prophylactic. This work was not finished until near the end of 1925. So far (July) during the year 1926 there is on record not one case of typhoid fever. Furthermore, during the same period not one case of bacillary dysentery has been admitted to the hospital. No cases of paratyphoid had been previously diagnosed, and no case has been admitted since the widespread inoculation.

PUBLIC HEALTH ACTIVITIES AGAINST TROPICAL DISEASES¹

By Dr. PEDRO N. ORTIZ, Commissioner of Health, Porto Rico

The racial characteristics of the Porto Rican people have their rooting in a purely Spanish ancestry, and they emerge from the period of colonization which is the longest in the history of the country. With the discovery of a new world by Christopher Columbus, Spanish adventures, warriors, priests, royal officers and assistants, conquerors later and, further on, merchants, bestowed life and founded a Spanish community like themselves under the protection of the different rulers of the various dynasties that have held the throne and exercised power in the old country.

There have been points of similarity in all the countries of America, and their formation is traced back to the influence of the Spanish, English, or French ascendants. In Virginia, when trade relations were agreed upon between the whites and the Indians, one of the Englishmen married Pocahontas, the daughter of an Indian chief. In the same way, when after the uprising in Porto Rico the Indians were subdued, one of the daughters of one of the chief caciques, by name Caguas, married a Spaniard.

When in the year 1607 the first Anglo-Saxon settlement rose on the west shores of the Atlantic Ocean with the name of Jamestown, the first colony of Spaniards had then 98 years of existence in the island of Porto Rico and at that time there were 2,500 white persons, excluding the garrison.

Florida was discovered on April 11, 1512, and it is thus seen that when San Juan, the capital of Porto Rico, was founded, Florida

¹ Reprinted from Journal of the American Institute of Homeopathy, September, 1926.

had not yet been discovered, neither had St. Augustine been established. These facts bring us to the conclusion that San Juan, the capital of Porto Rico, is the oldest city under the American flag.

In the year 1536, 50 Spanish farmers with their families were imported into Porto Rico in order to increase the population. Six years later, in 1542, when the freedom of the slave Indians was proclaimed by Charles the First of Spain and Fifth of Germany, there were only 60 Indians left. A great many had died of small-pox and a few more were found in the country and adjacent islands. The Spanish people at that time had scattered throughout the country and settled down independently of each other in isolated spots for farming purposes. This is the origin of the Porto Rican peasant who to-day suffers from hookworm disease. We may accept that there was a slight mixture, more or less, with the Indians in some instances, but nowadays the racial characteristics and the Indian spirit have disappeared. The country people who form the bulk of the population of Porto Rico to an extent of about 72 per cent are mostly white, but for centuries and generations they have been suffering from hookworm disease and, on the coast, from malaria.

In Porto Rico the health organization is very simple and efficient, the work is easily carried out without any interference, and the commissioner of health, who is appointed by the governor, is in charge of all matters pertaining to public health and insular charities. This organization is centralized absolutely. The work is uniform throughout and the municipalities do not have any intervention in public-health affairs. Our organization, in scope and extension, is like a State organization, but each municipality has a health unit that deals with all local affairs. In case of an epidemic or any unforeseen circumstance, then there is a moving unit that can be increased or decreased, acting under the control of the central office. This moving organization has ambulances, hospital equipment, experts in all the different services, so that at a given time the local force is not disturbed and the routine public-health work is carried on as usual. Porto Rico would furnish a standard for anyone who wants to see how centralization works in public health and this has been accomplished after failures in trying out the different systems.

Before entering into the subject under discussion I want to bring forth some facts about Porto Rico. This is a densely populated country having a population of 1,400,000 and about 90 per cent of this population depend upon agriculture for a livelihood. According to the Federal census of 1920, Porto Rico had at that time a density of population of 378.4 inhabitants to the square mile, more than ten times as great as the average for the United States. In that proportion the United States would have to-day a population

of 1,145,336,957 and, taking as a basis the density of population of the United States, Porto Rico would have a population of 121,942, about as many as the population of San Juan, the capital of the island. The gross area of the country is 3,435 square miles, larger than either that of Rhode Island or Delaware. In light of the fact that the Porto Ricans are not emigratory, our problem of over-population is serious; more so, if we take into consideration that the island can not provide sufficient facilities to furnish work for the people, there being a middle class who, due to the lack of industrial development, can not get sufficient employment. The relation of this situation to public health is evident and that is the reason why, like in any other country, poverty and lack of work bear their influence over morbidity and mortality. It is fundamental to take into consideration, more than disease, the earning capacity of a community. The best form of social welfare is the one that provides work with a fair return. Even if all the people can get employment and work either in skilled or unskilled labor the salaries and wages are low and this problem is the most serious handicap and obstacle to our public-health work. It is my opinion that only one factor is capable of determining this relationship and that is the rate of infant mortality, which in Porto Rico is still high—148 per 1,000 living births, and the number of deaths under the first five years of life in which, out of a total of 31,350 there were 15,368 or about one-half, due to a large extent not to lack of food but to the lack of proper food. Rickets is very rare, although a great many cases are reported, but the underlying cause is malnutrition, particularly among the poorer classes.

Japan is more densely populated, having 398 inhabitants to the square mile, but its industrial development insures better means of support to the people. The birth rate and the death rate are about like Porto Rico, but it is surprising to see that three-fifths of the arable land is owned by small peasant proprietors and the rest is mostly worked by tenant farmers.

Our public-health measures which are bringing down the mortality rate per thousand are, on the other hand, increasing the birth rate in the proportion of two to one. As a result we have about 30,000 newcomers every year that sit at the table where no new covers are provided. Tourists who visit the island on a short cruise and travel along the beautiful roads and contemplate from the distance with spectacles the beautiful mountains and deep valleys, and classify the different shades of green and look with amazement at the waving motion of the sugar-cane plantations, realize but little this situation. The undernourished condition of the poor people who depend on their daily earnings for their support is evident. This problem

of intense overpopulation is intensified by the lack of industrial development and by the gradual disappearance of the small land-owners who are being eliminated more and more every day by the consolidation of land holdings into fewer hands, from the sea to the mountains and along the inland valleys where the best lands are located.

Even when the country people have enough food to satisfy their appetite, the diet is ill-balanced—very rich in carbohydrates and exceedingly scanty in protein and fats. Protein is a tissue builder; children can get a very small supply of it to build up their human structure. In addition, hookworm and malaria, on one hand, incapacitate them both mentally and physically and, on the other hand, demand a heavy death toll due to lack of natural resistance, although the government authorities and the public in general realize this situation and although it is admitted that our public-health problem, more than education and public works, or any other activity, is the main problem. Money and more money is the key to the situation and this we are getting by all means. We can give advice, we can educate, we can enforce sanitary regulations to the limit, but no matter how much we do even in the light of a highly trained body of hard workers with a strong public opinion backing, in any public-health program the main factor is the economic factor, otherwise a desk organization is the result. The supreme law, the law of health, demands money, budgetary appropriations, for its enforcement.

Our main object is to protect health, to fight transmissible diseases, and at the same time to promote and institute a hygienic life in order to extend the term of longevity which corresponds to each individual. Besides conditions and cosmopolitan diseases that block this ideal in all the civilized countries, we have to add the two main causes of death in the world, aggravated here in Porto Rico by our peculiar social and economic structure and by our density of population; and these are infant mortality and tuberculosis. Then, on account of being a tropical country, there exist two other scourges—uncinariasis, or hookworm disease, and malaria. The former, as stated before, although they are universally extended, in Porto Rico reach extreme seriousness on account of our special social circumstances. The other two are common to all tropical and subtropical countries. These four entities are the ones on which we are concentrating most of our attention, as they impose their death toll on the poorer classes. Prof. Charles E. A. Winslow, of Yale University, who spoke on public health at Boston University last March, made the remarkable statement, with which I agree thoroughly, "that the cause of sickness had been eliminated by the more modern theory that

sickness is caused by poverty. We know what to do to keep well nowadays," he declared, "but often enough we can not afford to do it. The knowledge among mothers concerning proper treatment is widespread, but," he said, "often they can not put their knowledge into practice because of lack of economic resources." This theory is rational and natural, as, no doubt, the best form of social welfare is the one that enables the big mass of the poor people, which is the majority, to earn better salaries and higher wages. In Porto Rico, overpopulated with 378.4 inhabitants to the square mile, the poor people, who usually have the largest families and the lowest wages, are our main obstacle; and it seems that the curve of mortality follows year after year the fluctuations of the economic market.

The problem of tuberculosis and infant mortality is being seriously considered by all the Government agencies and by the public. The basic foundation is being laid in the form of health centers, clinics, and dispensaries in all parts of the island and by enlisting the co-operation of all the municipalities who are beginning to share the expenses.

In regard to malaria and hookworm the problem is different, as it can be handled through the agencies of the department of health. Malaria control requires a heavy expense, if conducted simply on the basis of public-health measures, as it is in most instances. The result obtained is of a temporary nature, particularly if carried out along the principles as established the world over to-day and underlined by sanitary science. In the light of modern experience we are obliged to change our method. It is of the utmost importance to consider the subject from the point of view of business possibilities in the first place, giving the antimosquito measures the second place. Let me explain:

No country, no government, can control malaria on a large scale by direct measures. It is possible to keep clean a small territory at the expense of large sums of money when a steady and permanent organization can be left on the spot. When the land and the places where the anopheles mosquito breeds can not be improved from the agricultural standpoint, when said land can not be retained for business purposes, it is better to depopulate it, leaving the mosquito in isolation, without a supply of plasmodia and human victims. In Porto Rico, through the aid of the big corporations and the municipalities, the people are being concentrated on healthful spots where they can be taken care of and where a sanitary barrier can be thrown around them. Even in the presence of an acute outbreak of malaria, cinchonization, which is only patchwork, can be better handled. According to law, no house even in the remotest spot and isolation and no land can be urbanized without permission of the department of health. At this time no constructions of any kind are allowed

in those places where the incidence of malaria is high and where the land can not be improved or is not a paying investment.

Taking into consideration the above statements, and after the antimosquito campaign and the dispensary work have been disregarded, our new organization at the present time acts in an advisory capacity with a very small expense for physicians, engineers, and field inspectors who are thoroughly trained both in public-health measures and in agricultural methods. The municipalities, the big corporations, and the landowners bear the expense, and this when they are shown that reclamation and improvement of potential breeding places of mosquitoes is profitable.

The problem of malaria in Porto Rico is intimately associated with that of sugar-cane cultivation, and, as sugar cane grows from the coast to the mountains and as the incidence of malaria fades out as the irrigation disappears, then all these lands are potential breeding places of mosquitoes, particularly those of the anopheline variety.

It is in such places that malaria causes every year a large amount of disability. This belt encircles Porto Rico except for a small gap which still exists on the northwestern coast. However, a new project of irrigation which is now being constructed will adjust the missing link and the chain will be completed.

Patients suffering from malaria in endemic centers are cases of long standing who get about in the community with misleading symptoms attributed to some other disease. The routine diagnosis made by many physicians does more harm than good. As per an investigation conducted at one of our control areas it was discovered that clinical cases of malaria, determined by the parasite index, had been reported as some other disturbance like dentition, gastrointestinal disorders, malnutrition, and rickets. Under specific medication normal life has been restored. It is better to suspect malaria and even administer treatment in all ill-defined cases than to make a wrong diagnosis because of repeated negative examinations from blood smears. Precious time is lost.

The incidence of malaria in Porto Rico can be demonstrated with a parasite index of 25 per cent on the coast, which fades out to about 6 per cent in the mountains, due to the fact that during the sugar-cane season, which extends from January to June, the people from the mountains flock to the coast, and when they go back to their homes they carry malaria with them.

It is also very common on the coast to find large groups of population actually in or bordering large swamp areas, reclamation of which for the present is not possible. The land does not belong to the poor people residing there, and it is very probable that the best solution of the problem will be to move the people to more healthful

spots. This has already been done in numerous places, and the first important step has been taken—that is, to prevent further extension of the population into these swamp areas. In regard to irrigation, it seems very probable that the water can be so handled as to keep production of mosquitoes below the point necessary to transmit malaria, as the anopheles mosquito does not breed in clean ditches.

Quinine has also been used to a large extent in Porto Rico and has been the chief method of attack in case of epidemics of the disease. Undoubtedly it has helped to keep the malaria incidence at a relatively low point in some regions, but has probably in general not been used to the best advantage, being either administered in tonics containing small quantities of quinine or by injection in small doses. Results of systematic administration of quinine, more or less, according to the standard method of the United States Public Health Service, have been encouraging. It is one of the most expensive measures, if the administration is supervised by an inspector. That is probably the only way that one can be sure that the medicine is being taken. Rigid systematic administration of quinine by the inspectors for a two-months' period will play in the future an important rôle, but antimosquito measures will become more effective than quinine administration, which will probably be limited just to the cure of the acutely ill with malaria.

Generally speaking, mosquitoes constitute a nuisance and they are a source of torture in this tropical country where natural climatic conditions favor their breeding. The public as a rule has the wrong idea, that from the public health standpoint the fight against malaria is a fight against the inconveniences produced by the mosquitoes and thus, in many localities, the authorities concentrate their activities toward this nuisance for the comfort of the people. When there are no insects that buzz and bite, so much relief is felt that words of praise are heard from grateful people even if the disease is playing havoc in a whole community, as very few anopheles which may have passed unnoticed, are necessary to light up an acute outbreak of malaria.

Small antimosquito measures, those that are routinely instituted toward tin cans, flower pots, empty bottles, cisterns, roof gutters, etc., do not bear any influence on the incidence of malaria. They will have their share in promoting the personal comfort of the population.

The campaign against malaria to-day should endeavor to educate the people of means to improve their lands and also to educate the industrial and agricultural corporations and city authorities in the way of providing sections or settlements away from malaria districts. In the greater portion of the coastal plain of Porto Rico there is no time of the year in which water deposits are not present, nor

is there any season in which full-grown larvæ and adult mosquitoes can not be found. In the light of this very nice tropical climate, intense breeding is stimulated throughout all the seasons.

The cultivation of sugar cane is widely extended and is being extended more and more every day. It is a source of revenue to the government and provides small wages for the laborers, but, on the other hand, the irrigation which keeps the fields soaked and the blades green and increases the production of sugar, also increases malaria to a very large extent. Land reclamation increases the production of cane but decreases the amount of malaria. The advantages are all on the side of land reclamation, while the advantages of irrigation are somewhat upset by the increased malaria.

UNCINARIASIS OR HOOKWORM

Before the discovery of the *Necator americanus*, a disease known as anemia was the cause of misfortune and suffering in Porto Rico. As far back as 1765 there arrived in Porto Rico Don Alejandro O'Reily, an Irish nobleman in the service of King Charles the Third of Spain, in order to study the conditions of the stronghold of San Juan from the defensive standpoint and in order to determine the needs of the people. He was struck from the start in finding out that the Porto Ricans would work very little, just barely enough to meet their physical demands. Probably they were suffering from hookworm. Col. George G. Flinter and Mr. André Pier Landrú in 1834 and 1810, respectively, made the report that the Porto Ricans were lazy, and in 1926, in those areas that have not been covered by our units, we can emphatically make the same statement.

This disease of unknown etiology until that time was naturally disregarded from the public health standpoint, and physicians and laymen used to prescribe iron in various forms for its treatment, of course ignoring the fact that the anemia was a symptom of uncinariasis. This term was generally accepted, as the main symptom of secondary anemia was constant in all the cases. Iron, of course, exerted very little, if any, influence on the disease. Advanced cases were very common, both in the rural and urban zones, but particularly so in the country. Col. B. K. Ashford, of the United States Army, discovered the fundamental cause and established the relationship between the parasites and the disease in Porto Rico in the year 1899. Prof. C. W. Stiles, of Washington, identified it as *Necator americanus*, a new species. Ashford soon demonstrated in a practical way the great benefit of the treatment, and it was not until 1904 that the first sum of money, amounting to \$5,000, was voted by the Porto Rican Legislature and, as a fundamental step, the first anemia commission was created. The first phase of the work was

dedicated to diagnosis and treatment. Sanitation, from a practical and permanent standpoint, was not given due consideration, as its importance, although known by those in charge of the work, was recommended from the dispensaries together with the use of shoes, which at one time was regarded as the most important factor in the fight against the disease, and this idea gained a good many followers who at the present time do not give it any consideration.

When a new survey, after 20 years of trial, was carried out with the cooperation of the International Health Board of the Rockefeller Foundation it was discovered that approximately 90 per cent of the rural population were again suffering from hookworm disease. Then sanitation was permanently organized, and the construction of latrines was started under the personal direction of rural inspectors. This was the first step toward organizing the campaign on the ground of public-health measures, and this work has been kept up and is being extended more and more every day, progressively, being at this time the most important service of the department of health of Porto Rico. Now the importance of sanitation has gained the unanimous trend of public opinion, as permanent constructive work is made evident in those areas that have already been covered by the units. By the foregoing statement it may be seen that, although the cause of anemia was discovered in 1899 and adequate treatment administered, nevertheless it took 20 years to come to the present organization which is accepted to-day as a standard. The comparison of both methods has been carefully determined lately in areas that have been selected for the purpose, namely, treatment with sanitation and treatment without sanitation, in which reinfection naturally keeps the community under a constant menace and the disease can not be stamped out.

Uncinariasis is mainly a debilitating disease that lowers the body resistance and prepares the victim for other virulent diseases. It is slow and insidious, with an exceedingly high morbidity and a very low mortality from direct causes. The physical aspect of a hookworm patient is one of sorrow and misfortune to be pitied. He has no ambition, is indifferent, and indolent. He can not support his family and hardly himself. Sometimes he comes to be a public charge, being a burden upon the State. He does not give his employer a proper return for the wages which he is paid. In fact, the more advanced cases are physical wrecks. With an average of 30 per cent hemoglobin one is physically unfit to lead a normal life.

In the light of all this misfortune it is surprising to see how easily they are cured and how quickly they can be restored to normal life at the small expense of \$1.17 and how useful they become to society. Twenty years have been necessary to set this work on a sure footing. A clean district, after all the houses have been provided with the

corresponding sanitary installations, be this a privy, a cesspool, or a toilet, is a new community with a new life. Where poverty, idleness, squalor, and disease reigned, the sun of a new era shines, and happiness and joy strengthen the action of new arms and farm hands. After the puffiness disappears, and the mind gets a new supply of energy, and the muscles are restored to their normal texture, cheerful faces emerge from the gloom of invalidism.

When sanitation has preceded treatment and the sanitary work remains under constant vigilance from the health authorities, so that the soil remains clean, then there is no danger of reinfection and shoes can be disregarded or, more so, not taken into consideration, especially when the resources of the poor people are not even sufficient to meet their daily necessities in regard to food and clothing. This is an economic problem which, in the places where the salaries are low and the families large, we can not on any account give any consideration. This old idea about shoes has been the cause of delay in the work against uncinariasis. As it is known, there is no reproduction in the intestinal canal, the adult worms lay their eggs which are passed out with the excreta and these eggs, from which the larvæ develop, keep the soil always contaminated and ready to infect new victims. When the soil is clean there is no reinfection, and when the last parasite dies in the intestine as a result of maturity, from purely natural causes, then the patient is free from hookworm without having had to take any treatment. In this way can be seen the rôle that the latrine plays, from the sanitary standpoint, to ward off reinfection.

As I said before, the municipality which shows the highest morbidity index, about 95 per cent, gives the lowest general mortality in Porto Rico, 7 per 1,000, thereby bringing about a community of invalids incapacitated properly to earn their own living. With lack of proper food as the result of a reduced earning capacity in about 75 per cent, undernutrition is very marked and serious. Although cities and towns have adequate sanitary installations, nevertheless the infection ranges in the urban zone from 45 to 85 per cent and in the rural from 80 to 95 per cent; the graded schools show 80 per cent infection.

Although the *Necator americanus* is the cause of the universal infection, nevertheless, in 25 per cent of the cases, the *Ankylostoma duodenale* has been found in association. Brazil is to-day considered a zone of high infection and the seriously infected persons carry only 130 worms. In Porto Rico the general average gives 419 parasites per patient. This shows that the infection in Porto Rico is very high. Long standing advanced cases expel thousands of parasites. The larvæ reach maturity in five days and the contamination

of the soil is practically over in six weeks; that is, the length of their lives. A female parasite can expel daily about 9,000 ova, and it is accepted that in six weeks the larvæ reach the adult stage in the intestinal canal after having entered through the skin.

The size of the male parasite is a little less than one-half inch and the size of the female parasite is a little over one-half inch. It is believed that they can live in the intestine for a period of from 5 to 10 years.

To meet the demands of the work that from year to year has been increasing we have created the Bureau of Uncinariasis, which, in fact, is a Bureau of Rural Sanitation. Although this bureau gives preferent attention to the problem of hookworm control, it is at the same time endeavoring to bring up a better standard of living among the country people, trying to prepare a suitable environment, and instituting elementary rules of education for the purpose of uplifting their physical and mental capacity. Porto Rico will soon have a more resourceful and healthy population, and I emphatically state this because this phase of public-health work is particularly being supported and strengthened by the unanimous trend of public opinion, otherwise it might be impossible for us to correct in a few years the habit of centuries. The importance of the work is measured by the fact that about 72 per cent of the population of Porto Rico live in the rural zone, scattered and isolated and away from contact and association with community life.

The influence of the educational work which is being carried on through conferences, house-to-house visits, demonstrations, articles in the papers, moving pictures prepared in our health studio, the cooperation of the big corporations and the landowners are bringing about highly gratifying and satisfactory results. The fact that Latin people grasp new ideas and quickly adjust to new conditions if they tend to promote their welfare and happiness is demonstrated when our inspectors, who move like an army across valleys and mountains, following preconceived plans of work which are laid out and framed up by the staff, is shown when new areas are selected in which no sanitary measures have been instituted. It is found that the people, in anticipation, have already, without any advice or suggestion, performed part of the work. They receive the invaders—if we might use this term—with deep sympathy and friendship, taking great pains to demonstrate the privies constructed, which, in many instances, are better than the original homes. The bureau of rural sanitation has a staff of 1 Chief of the Bureau, 2 medical inspectors, 3 general field inspectors, and a field personnel composed of inspectors, technical assistants, drug clerks, and care-

takers. It has a division of sanitation and a division of treatment. The division of sanitation is, furthermore, divided into construction and conservation.

The method of procedure is as follows:

The construction or sanitation units, each under a chief inspector, select a municipality. When the whole area is ready and all the houses are provided with standard pit latrines the treatment units administer the treatment from house to house. When the zone has been cleaned and treated, then a small permanent force is left in each finished district to see that the work is not neglected. This work of conservation and reinspection is exceedingly important, as otherwise, in time, through ignorance and lack of interest, it might be neglected. The permanent conservation force extends also its educational propaganda into the rural schools. No doubt, sanitation, treatment, and conservation, after the appropriations are adequate to meet the demands of the increasing amount of work, should control uncinariasis in a relatively short time. Otherwise, no matter how much we have done and how wide in scope our plans might be, if the enthusiasm and interest are allowed to diminish as in the past, the situation will return to its former condition. The increasing amount of reinfection would again bring up the old 90 per cent morbidity when the campaign was not methodically and systematically organized as it is at present.

The simplicity of the treatment which is used to-day has a large bearing on the rapidity with which the campaign advances from municipality to municipality. The remedy now used is a mixture of carbon tetrachloride and oil of chenopodium in the proportion of 2 to 1. This mixture in standard dosification is given once, followed 12 days later by thymol. It is admitted that from 80 to 85 per cent are cured in so short a period of time, and no examination is necessary, so that after the preliminary sanitation work is finished then the treatment is a matter of only a few days. Fifty thousand worms, for the purpose of determining on a large scale the total number collected in a whole district, were sent to my office. They were obtained from 125 persons in a heavily infected zone after treatment was administered. Great pains and tedious work were necessary to get these parasites, and I can say now with pride that the misfortune and disease of a whole community is in my hands at a total small expense of \$146.25, and these strong and convincing arguments supply material for many practical lessons.

Porto Rico is going forward. We are meeting our public-health problems and all our problems with energy and good will and without hesitation. It is up to us to adjust adverse conditions which have

their rooting in our peculiar social structure. We have our own personality and, in harmony with our racial characteristics, modified by an Anglo-Saxon education, we are prepared to forge the connecting link between the north and the south.

In public health, according to our experience, we are bound to establish our own rules, and, for our educational propaganda, we have to modify and construct. The decided cooperation of the insular legislature and of all the executive branches of the government is a source of inspiration to me. The task of uplifting the physical capacity of the people can not be accomplished in a brief period of time.

Pictures for educational propaganda made in the United States serve no purpose in Porto Rico, and we have had to disregard them altogether. For that reason, we have established our own Health Studio, a demonstration of which will appear on the screen very shortly.

With the cooperation of the United States and with the advice and assistance of men of high ideals and noble character, our country is coming to be a model in the different government activities and the pride of Pan American institutions and ideals. No doubt we have not yet attained perfect development, but we are aware of what we are doing and of what we shall have to do in the future. Our culture at the present time is neither American nor Spanish; it is a new culture.

Before closing I desire to express my recognition for the valuable services rendered to Porto Rico by the International Health Board of the Rockefeller Foundation, fully cooperating with us in the organization of the campaign against hookworm and malaria.

I bring to you the greetings of a tropical American community and a message of sympathy from the fellow citizens of Porto Rico.

**SCARLET FEVER ATTACK RATE AMONG CONTACTS—EXPERIENCE
RECORDED IN DETROIT, MICH.**

The following discussion under the heading, "What to do with scarlet fever contacts," is taken from Weekly Health Review published September 18, 1926, by the department of health, city of Detroit:

The answer as to what ought to be done with susceptible contacts to scarlet fever will perhaps eventually be to have them immunized. The figures to which we are about to refer are based on cases of a year ago, before scarlet fever protection was practiced to any appreciable extent, and the question of immunization is therefore not considered. It has been and still is the general rule for susceptible scarlet fever contacts to do one of three things: (1) Stay

at home with the patient, (2) stay at home and have the patient go to a hospital, (3) go to stay at some adult friend's home.

A total of 2,921 primary cases of scarlet fever resulted in the direct exposure (members of the same family or household) of 11,338 persons, or 3.8 per case. Of these exposures, 430, or 3.8 per cent, contracted the disease. The following table shows the disposal of contacts and how many of them contracted scarlet fever.

Scarlet fever contacts and secondary cases

	Under 11 years	11-20 years	21 years and over	Total
At home with patient:				
Contacts.....	1,243	320	1,833	3,396
Secondary cases.....	247	27	47	321
Per cent contracting disease.....	19.87	8.43	2.56	9.45
At home, patient in hospital:				
Contacts.....	1,586	586	2,186	4,358
Secondary cases.....	77	16	14	107
Per cent contracting disease.....	4.85	2.73	.64	2.45
Staying at adult friend's home:				
Contacts.....	690	724	2,170	3,584
Secondary cases.....	1	0	1	2
Per cent contracting disease.....	14	-----	.04	.05
Totals:				
Contacts.....	3,519	1,630	6,189	11,338
Secondary cases.....	325	43	62	430
Per cent contracting disease.....	9.23	2.63	1.00	3.79

For the compilation of the figures in this table we are indebted to Mr. M. P. Isaminger, research student at the University of Michigan.

These figures show conclusively that it is dangerous for contacts to remain at home with the patient. Such contacts of all ages are approximately four times as likely to contract the disease as are contacts staying at home when the patient has gone to the hospital. For those contacts who are most susceptible, those under 11 years of age, the danger is more than four times as great. An even greater difference is to be found between those contacts who remain at home with the patient and those who are removed to some adult friend's home. In the "under 11-year" age group the contacts remaining with the patient seem to be one hundred and forty-two times as likely to get scarlet fever as those going to live with friends. While there seems no doubt but that it is good policy for susceptible contacts to go to live with adult friends, these figures demand some explanation. In some instances it takes several days to make arrangements for the children to be removed to a friend's home and during this time some of them come down with scarlet fever. If all contacts were removed within a day of the time the first patient was taken sick, quite a number of them would doubtless come down with the disease while at the friend's house who are now taken sick at home before arrangements have been made for their transfer. Likewise the number contracting the disease after the patient is removed to the hospital would be smaller if the patient went to the hospital immediately after being taken sick. A good many cases do not go to the hospital for several days, and this continued exposure quite naturally results in a larger number of secondary cases than would have developed had the original case been removed immediately.

Don't let child contacts to scarlet fever stay at home with the patient; it is dangerous practice.

It is good policy to remove such contacts to some adult friend's home where there are no children.

HEALTH OF THE NAVY

The general admission rate, based on statistical returns for diseases and injuries occurring in July, August, and September was 540 per 1,000 per annum. The corresponding rate for the first quarter of the year was 546, and for the second quarter, 476. Based on experience in recent years the expected rate from all causes for the third quarter would be 550.9 per 1,000.

The admission rate from disease, 463, was not higher than expected. The admission rate from accidental injuries, 69 per 1,000 per annum, was higher than the expected rate of 60 or less.

Acute respiratory diseases, in general, were not more prevalent than expected. Only 313 cases reported as influenza were notified. The incidence of measles was somewhat greater during the first and second quarters than in 1925, but only 89 cases were reported in the third quarter. Two cases of cerebrospinal fever occurred at United States naval training station, Great Lakes, Ill., in July; 4 cases at United States naval training station, Newport, R. I., in August; and 1 case on board the U. S. S. *Concord* in September.

TABLE NO. 1.—Summary of morbidity in the United States Navy and Marine Corps for the quarter ended September 30, 1926

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	75, 412	38, 546	19, 463	113, 958
All causes:				
Number of admissions.....	8, 568	6, 808	2, 968	15, 376
Annual rate per 1,000.....	454. 45	708. 47	609. 95	539. 70
Disease only:				
Number of admissions.....	7, 485	5, 708	2, 371	13, 188
Annual rate per 1,000.....	397. 00	591. 80	487. 26	462. 90
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	1, 829	1, 885	637	3, 714
Annual rate per 1,000.....	97. 01	195. 61	130. 91	130. 36
Venereal diseases:				
Number of admissions.....	2, 494	832	486	2, 336
Annual rate per 1,000.....	132. 28	86. 34	99. 88	116. 74
Injuries:				
Number of admissions.....	1, 041	929	493	1, 970
Annual rate per 1,000.....	55. 21	96. 40	101. 32	69. 15
Poisoning:				
Number of admissions.....	42	176	104	218
Annual rate per 1,000.....	2. 23	18. 26	21. 37	7. 65

TABLE No. 2.—Deaths reported, entire Navy, during the quarter ended September 30, 1926

		Navy			Marine Corps		Nurse Corps	Total
		Off-icers	Mid-ship-men	Men	Off-icers	Men		
Average strength.....		8, 539	1, 663	83, 818	1, 174	18, 291	473	113, 958
CAUSES—DISEASES								
Primary	Secondary or contributory							
Abscess, brain.....	None.....			1				1
Abscess, left shoulder.....	Pyemia.....			1				1
Alcoholism, acute.....	None.....				1			1
Do.....	Edema, lungs.....					1		1
Alcoholism, chronic.....	do.....			1				1
Appendicitis, acute.....	Postoperative intestinal ob- struction.....			1				1
Do.....	Poison, anesthetic, ether.....			1				1
Do.....	Peritonitis, general, acute.....					1		1
Arteriosclerosis, general.....	Embolism, right coronary artery.....			1				1
Cellulitis, face.....	Thrombosis, cavernous ar- tery.....			1				1
Cerebrospinal fever.....	None.....			1				1
Carcinoma, abdomen.....	do.....	1						1
Carcinoma, colon.....	Peritonitis, general, acute.....	1						1
Carcinoma, colon, descend- ing.....	None.....	1						1
Carcinoma, rectum.....	Obstruction, intestinal from paralytic cause.....			1				1
Diebetes, mellitus.....	Cholangitis, acute.....			1				1
Epilepsy.....	Cerebral hemorrhage.....					1		1
Influenza.....	Edema, lungs.....	1						1
Meningitis, cerebrospinal.....	None.....					1		1
Myocarditis, chronic.....	Dilatation, acute cardiac.....	1						1
Nephritis, acute.....	None.....			1		1		2
Pneumonia, lobar.....	do.....			1				1
Do.....	Endocarditis, acute (con- tributory, syphilis, aortit- is, endocarditis, chronic).....					1		1
Pleurisy, serofibrinous.....	Embolism, pulmonary.....			1				1
Syphilis.....	Myocarditis, acute.....			1				1
Do.....	Thrombosis, cerebral.....			1				1
Tuberculosis, general mil- itary.....	Anemia, pernicious.....			1				1
Tuberculosis, chronic pul- monary, general military.....	None.....					1		1
Ulcer, duodenum.....	Pneumonia, broncho.....			1				1
Ulcer, stomach.....	Hemorrhage, stomach.....			1				1
Total for diseases.....		5		18	1	7		31
CAUSES—INJURIES AND POISONINGS								
Asphyxiation.....	None.....			1				1
Electric shock.....	do.....					1		1
Fracture, compound, third and fourth rib.....	Hemorrhage, traumatic both lungs.....					1		1
Fracture, compound, skull.....	None.....			1		1		2
Do.....	Hemorrhage, intracranial.....			2		1		3
Fracture, compound, cran- ium.....	None.....			1				1
Fracture, simple, skull.....	do.....					1		1
Do.....	Hemorrhage, traumatic cere- bral.....			1		1		2
Do.....	Hemorrhage, traumatic in- tracranial.....		1					1
Fracture, simple, cervical vertebrae.....	Ulcer, decubital and paraly- sis, paraplegic.....			1				1
Intracranial injury.....	None.....			1				1
Do.....	Hemorrhage, traumatic.....			1		2		3
Injuries, multiple extreme.....	None.....	8		7		10		25
Do.....	Embolism, pulmonary.....			1				1
Do.....	Hypostatic pneumonia.....	1						1
Do.....	Avulsion, abdominal vis- cera.....					1		1

TABLE No. 2.—Deaths reported, entire Navy, during the quarter ended September 30, 1926—Continued

		Navy			Marine Corps		Nurse Corps	Total
		Off- cers	Mid- ship- men	Men	Off- cers	Men		
CAUSES—INJURIES AND POISONINGS—continued								
Primary	Secondary or contributory							
Submersion, nonfatal.....	Pneumonia, broncho.....			1				1
Wound, penetrating, brain..	None.....			1		1		2
Wound, penetrating, heart..	do.....			1				1
Wound, penetrating, abdom- en.	Peritonitis, general acute.....			1				1
Drowning.....	None.....			13	1			14
Do.....	Alcoholism, acute.....			1				1
Poisoning, food (salmonella group).	None.....	1						1
Total for injuries and poisonings.....		10	1	35	1	20		67
Grand total.....		15	1	53	2	27		98
Annual death rate per 1,000, all causes.....		7.03	2.41	2.53	6.82	5.90		3.44
Annual death rate per 1,000, disease only.....		2.34		.86	3.41	1.53		1.09
Annual death rate per 1,000, drowning.....				.67	3.41			.53
Annual death rate per 1,000, injuries.....		4.22	2.41	1.00		4.37		1.79
Annual death rate per 1,000, poisoning.....		.47						.03

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by boards of review at naval training stations:

Cumulative data

	Number	Per cent of recruits received	Per cent of recruits reviewed
JANUARY 1 TO DECEMBER 31, 1925			
All naval training stations:			
Recruits received during the period.....	9,385		
Recruits appearing before board of review or medical survey.....	688	7.33	
Recruits recommended for discharge from the service.....	465	4.95	67.59
JULY, AUGUST, SEPTEMBER, 1926			
U. S. naval training station, Hampton Roads, Va.:			
Recruits received during the period.....	1,500		
Recruits appearing before board of review or medical survey.....	34	2.27	
Recruits recommended for discharge from the service.....	31	2.07	91.18
U. S. naval training station, Great Lakes, Ill.:			
Recruits received during the period.....	1,360		
Recruits appearing before board of review or medical survey.....	36	2.65	
Recruits recommended for discharge from the service.....	36	2.65	100.00
U. S. naval training station, San Diego, Calif.:			
Recruits received during the period.....	1,551		
Recruits appearing before board of review or medical survey.....	41	2.64	
Recruits recommended for discharge from the service.....	27	1.74	65.85
U. S. naval training station, Newport, R. I.:			
Recruits received during the period.....	1,456		
Recruits appearing before board of review or medical survey.....	92	6.32	
Recruits recommended for discharge from the service.....	46	3.16	50.00

ADMISSIONS FOR INJURIES AND POISONING, THIRD QUARTER, 1926

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during the third quarter, 1926, is based upon all Form F cards covering admissions in those months which have reached the bureau:

	Admissions, July, August, and September, 1926	Admission rate per 100,000 per annum	Admission rate per 100,000, year 1925
INJURIES			
Connected with work or drill.....	976	3,426	3,343
Occurring within command, but not associated with work.....	627	2,201	2,001
Incurred on leave or liberty or while absent without leave.....	367	1,288	1,049
All injuries.....	1,970	6,915	6,393
POISONING			
Industrial poisoning.....	7	25	25
Occurring within command, but not connected with work.....	94	330	490
Associated with leave, liberty, or absence without leave.....	117	411	16
Poisoning, all forms.....	218	765	531
Total injuries and poisoning.....	2,188	7,680	6,924

Percentage relationships

	Occurring within command				Occurring outside command	
	Connected with the performance or work, drill etc.		Not connected with work or prescribed duty		Leave, liberty, or A. W. O. L.	
	July, August, and September, 1926	Year 1925	July, August, and September, 1926	Year 1925	July, August, and September, 1926	Year 1925
Per cent of all injuries.....	49.5	52.3	31.8	31.3	18.6	16.4
Per cent of poisonings.....	3.2	4.7	43.1	92.2	53.7	3.1
Per cent of total admissions, injury, and poisoning titles.....	44.9	48.6	33.0	36.0	22.1	15.4

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction," or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases, selected from July, August, and September reports, are worthy of notice from the standpoint of accident prevention:

Open and unguarded hatch.—A man coming out of the fireroom of a cruiser fell through an escape hatch which had been left open by an unknown person. Injury, lacerated wound of the scalp. Loss of time, 5 sick days.

Insecure hatch cover.—A man stepped on an improperly secured hatch cover while helping to house an awning. He fell into the hatch. Injury, lacerated wound of a knee. Loss of time, 14 sick days.

Open and unguarded hatchway.—The hatchway in question had been opened on board a transport for the purpose of taking fresh-water soundings. A fireman fell through it. Injury, multiple wounds of the head. Loss of time, 14 sick days.

Open and unguarded hatch.—The accident occurred on board a battleship. The ladder had been removed but the hatchway had not been lined off. A seaman fell through it. Injury, multiple contusions of the scalp and body. Loss of time, 8 sick days.

Open and unguarded manhole.—A manhole in one of a battleship's firerooms had been left uncovered through negligence. A fireman fell through the hole. Injury, multiple lacerations of a knee and hip.

Open and unguarded manhole.—Lights were moved from an open manhole by navy yard workmen. Presumably it was necessary to leave the hole uncovered. A man fell through it at night. Injury, contusions of left knee. Loss of time, 3 sick days.

Carelessness in letting down a hatch cover.—A seaman in letting down a hatch cover over the galley removed a pin on the inside under the impression that the cover was supported by another pin. The cover fell on his head. Injury, lacerated wound of the scalp.

Defective line on boatswain's chair.—The line parted while an electrician was in the chair rigging illuminating gear on board a battleship. He fell 30 feet. Injury, simple fracture left ankle.

Unsound boatswain's chair.—By his own negligence a seaman stepped into an unsound boatswain's chair which was suspended from the bridge of a battleship. He fell to the deck below. Injury, simple fracture left fourth metatarsal bone.

Defective line.—A line which was holding an object weighing 300 pounds parted while the object was about 6 inches above a man's foot. Injury, crushed toes, right foot. Loss of time, 20 sick days.

Mess tables and benches, careless handling of.—Many injuries of minor importance were reported. These undoubtedly resulted from lack of reasonable care in most instances.

Fall into dry dock, attributable to defective life line or chain.—A coxswain while handling a hose leaned against the chain surrounding a dry dock. The chain had been mended with manila line. The latter parted. Injury, contusions. Loss of time, 28 sick days.

Gasoline, careless use of.—A man stood too near a lighted candle while scrubbing his hands with waste soaked in gasoline. Injury, burns of both forearms and hands. Loss of time, 13 sick days.

Gasoline, carelessness in the use of.—A man attempted to remove the burning torch from a torpedo while his hands were saturated with gasoline. Injury, severe burns. Loss of time, 10 sick days.

Gasoline, careless use of.—A member of the engineer's force stood near an open flame while cleaning his hands with waste saturated with gasoline. Injury, burns of both hands and arms.

Unsafe practice with gasoline line on motor car.—An officer attempted to clear a gasoline line on his automobile by sucking on the disconnected pipe. He swallowed and inhaled a sufficient quantity of gasoline to poison him. Result, 5 sick days.

Dangerous practice with gasoline.—A coxswain used gasoline to start a fire in a stove. An explosion occurred. Injury, multiple burns. Loss of time, 21 sick days.

Unguarded power-driven rip saw.—A marine lost his left middle finger while operating the machine.

Carelessness in the operation of a meat grinder.—A seaman who was feeding onions into the grinder caught his finger. Injury, avulsion of the finger. Loss of time, 31 sick days.

Lack of experience or carelessness in the operation of a dough mixer.—A marine caught his right hand in gears while operating a dough mixer. Injury, lacerated wounds of three fingers. Loss of time, 28 sick days.

Unsafe practice with a knife.—A mess cook left a knife on the deck with the point and cutting edge up. A seaman struck it with his foot. Injury, incised wound, right great toe. Loss of time, 7 sick days.

Failure to wear protective goggles while operating a lathe.—One man was on the sick list 2 days after a piece of steel became embedded in his eye. Three days later another man working at the same lathe was injured in the same way. He was on the sick list 5 days.

Failure to wear protective goggles while operating a drill press.—Chips of steel lodged in the operator's eye. Loss of time, 6 days.

Failure to wear protective goggles while operating an emery wheel.—A piece of emery lodged in the operator's eye. Loss of time, 2 days.

Faulty insulation of electric wire coupled with lack of precaution in making repairs to same.—An electrician incurred electrical burns of both hands. Loss of time, 5 days.

Defective switch.—A broken spring in a switch caused a short circuit when an electrician closed the switch. Injury, electrical burn of right hand. Loss of time, 10 days.

Leaky rubber boots; lye-water burn.—Leaky boots were issued to a marine private to wear while washing down a mess hall with lye water. Injury, chemical burns of feet. Loss of time, 8 days.

Unsafe practice.—While launching a seaplane, a man, weighted with regulation outfit, went into water over his depth and was drowned.

Acute lead poisoning.—Four cases of acute poisoning by lead occurred on board one battleship. Poisoning was incidental to the work of painting double bottoms with red lead. The loss of time in the case of the man most seriously affected was 8 sick days.

Chronic lead poisoning.—Chronic poisoning occurred in the case of a fireman engaged in chipping double bottoms over a period of two months. Loss of time, 94 sick days.

Cresol—Chemical burn.—Waste saturated with cresol was left on top of a gasoline can. A man, thinking it was gasoline, picked it up to clean grease from his arms. Loss of time from chemical burns, 10 sick days.



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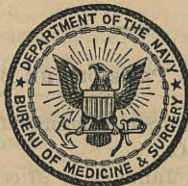
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TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE

THE UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General, United States Navy.

PREFACE

NOTICE TO SERVICE CONTRIBUTORS

Contributions to the BULLETIN should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated, if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscript and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

U. S. NAVAL MEDICAL BULLETIN

VOL. XXV

APRIL, 1927

No. 2

SPECIAL ARTICLES

MEDICINE IN TURKEY

By C. W. O. BUNKER, Commander, Medical Corps, United States Navy

Medical matters in Turkey have interested me not only because of the two years that I spent there between 1923 and 1925 but also by reason of the fact that foreigners, including medical men, whom I approached on the subject, could give me but little first-hand information. The comment of westerners was practically uniformly adverse to the Turk, but I was not convinced, as I did not feel that their association with their Turkish confrères had ever been intimate.

I have been surprised that medical men from western Europe and the United States could spend years, or all their lives, in Turkey, and still have no real contacts with the medical institutions of the country. And even I can not claim actual touch with more than Constantinople, where standards and conditions are doubtless the best in the country. My knowledge of Anatolia comes from other sources.

It may also be well to note that, in this rapidly changing country, conditions may already have altered somewhat from their status as found in my notes; or prospective changes may have been realized before this is published. At any rate, I have visited and inspected the institutions of my Turkish confrères, seen them at work and at play, and I feel that I know something of them.

One factor operating for the isolation of foreign medical men is, of course, that of language, although the Turk is usually a linguist and speaks French or German, and occasionally English or some other language as fluently as his native tongue. The chief reason, however, would seem to have been that the doctor, to a large extent if not wholly, could and would confine his activities to his fellow countrymen, and the necessity for incursions among Turkish institutions was infrequent. Even if he were treating Turks, this would be done from or in his own hospitals or dispensaries.

Such a condition of affairs would arise in scarcely any other country than Turkey, and there it was the result of the remarkable situa-

tion arising from the capitulations (or treaties) by which Turkey granted to resident foreigners the rights of autonomous communities. Other nations were guests, and self-sufficient; and intercourse with the Turks was reduced to a minimum so long as there was no encroachment upon Turkish premises.

The capitulations existed under Byzantine rule, and were continued by Mehmet the Conqueror when Constantinople fell to the Ottomans in 1453. Privileges of foreigners were extended under succeeding sultans, and held until the abolition of the capitulations in 1914. Then followed the chaos of the World War and the occupation of Constantinople by the Allies. Since the evacuation of the Allies in 1923 foreigners find themselves in the stage of readjustment to new conditions. The memory of their former privileges in connection with present irritations does not improve the *entente cordiale*.

The Turks, in inception and career, have been essentially warriors. "Might is right" has been their inheritance, and, in common with the other races of the Near East, they are more callous to human and animal suffering and death than are we. They have been credited with some wiliness in diplomacy. In the arts, sciences, and other peaceful pursuits, the Turk has been a borrower and follower, evincing but little of the creative talent, and drawing upon subject or other races for what he has desired or needed.

As an individual, one finds him courteous, affable, and self-respecting; intensely proud, and in no sense servile. The honesty and integrity of the peasant class is well recognized. The traditions and world of thought of the Turk make the foreigner seem odd to him. When abroad, he can seem more European than any westerner, but, once more at home, he is again the Turk.

Centuries of sad experience have made him mistrustful of foreigners. A smile and a show of cheerfulness will overcome much of his mistrust; but sourness, none at all. He suspects an ulterior motive not to his best interests behind any advances. He doubtless realizes his need of assistance in his advancement, but resents having it thrust upon him. Criticism has been his lot for so long that his pride is up in arms, and he is most sensitive to anything resembling the finger of scorn; and his sensibilities were most decidedly ruffled during the allied occupation of Constantinople after the World War.

The past few years have seen changes in the country that are revolutionary, especially when viewed from the standpoint of the Moslem. Turkey has asserted her right to a place among sovereign nations and emphasized it by the abolition of the capitulations. The deposing of the Sultan was followed by the separation of church and state, further security being assured by the expulsion of the Caliph and the rest of the imperial family, the application of restrictive measures to the religious class, and the exchange of popula-

tions. Woman has been permitted to lay aside the veil, emerge from the seclusion, and even to dance in public places. The President of the Republic has discarded the fez and now the speed of vehicles in Constantinople has been limited to 10 miles per hour. Those who were there before this last change was made will appreciate its radical nature.

The imperial régime abolished, the Republic declares itself eager to emulate the progress in peaceful pursuits of western countries. It realizes its inability to do so by reason of lack of trained personnel and is securing advisers from abroad with the intention ultimately of developing experts among its own people. But one notices that care is taken to make the adviser simply that and nothing more. Instead of permitting him actually to manage in his field, as was done in former times, the Turk is to do that himself and with his own people.

Physically, I would consider the male Turk good looking, masculine, and virile—a fact easily comprehensible when one considers the foreign blood brought so plentifully to the nation through the mothers during the past centuries. It remains to be seen whether he has the vision and the ability for mental and physical concentration and application so necessary to the realization of his aims. At any rate, he has faith in his ability to do the work that heretofore he has forced or hired others to do for him. Education of the mass of the people must certainly attain a higher level than at present before promising fruition can be expected. The progress of such a movement in a race trained primarily for war will be interesting.

The relation of the medical profession to this ambitious program is most encouraging. The Turkish doctor stands high in the community, being respected both as a healer and as a member of the enlightened class. He is well educated at home and often abroad. One is astonished to see the number who have been diverted from their professions into public life, especially into politics.

The result is that, among those who administer the affairs of the country, there is a potent leaven that is always working for improvement in conditions affecting health. It is a well-known fact that the medical fraternity was a source of worry to the last sultans. The medical school was transferred from Stamboul across the Bosphorus to Haidar Pasha, where it would not be so near the imperial residence and where it was hoped that the possibilities for intrigue could be more easily curtailed.

I have been continually impressed with the apparent interest shown by the Government and the newspapers in matters pertaining to the public health. From what I have seen myself and heard from others I am convinced that real intelligent interest and energy are being applied in attacking its problems. It is a pleasure to be able

to say that I have never heard graft and the Ministry of Health and Social Assistance connected, and this despite the small salaries received. Of course, as anywhere, one encounters instances of corruption among minor officials, but I must confess that I believe it to be limited to the bottom. It was an encouraging example of devotion to the public welfare when the Minister of Public Health was this year offered six millions of Turkish pounds for his work and declined to accept more than four millions because he felt that the work and the personnel was not as yet adequately organized and trained properly to utilize more than that sum.

I understand that there are about 2,000 doctors in the country, which number probably includes the small sprinkling of foreigners. The Turkish medical men whom I have encountered have, naturally, been mostly in Constantinople and in prominent positions in institutions. I have found them to be dignified, intelligent, industrious, and able practitioners who are devoted to their profession. The really excellent education that they can receive in the local medical school has usually been supplemented, and often entirely replaced, by work in the best institutions of Western Europe or even America.

A diploma from a secondary school (equivalent to our high school) is required for entrance to the Turkish medical school. Six years' work is necessary to secure a diploma, the sixth year being spent in a Constantinople hospital (Hôpital Gul-Hané) which is specially organized for clinical instruction. The first year in the medical school is devoted practically entirely to biology and sciences now considered as premedical studies in the United States.

Other medical schools in Turkey have been an American one in Beirut, Syria; a French one, also in Beirut; and the Constantinople Woman's College. The first two are no longer in Turkey, and the last was closed because, by a decision of the Turkish Government, foreign schools were no longer permitted to conduct professional departments.

Since the World War, the countries of Europe have pretty generally refused to grant new licenses to foreigners for the practice of medicine. Those who were licensed previously can continue to practice. Turkey has put the same ruling into effect, even refusing a license to Moslems, such as Arabs, Egyptians, Persians, and Afghans, who graduate from the Turkish medical school. There are rumors, however, that she may relax somewhat in company with some other countries. For her to do so would be a gracious act of much more significance than if the same were done by, for example, Italy. The refusal to let foreigners practice could be based anywhere on the ground that the nation considers that it has enough good doctors to handle disease and that the admission of foreigners would only result in lessened remuneration for the natives. Turkey

could add to that a growing resentment against the superior airs assumed by her guests. Furthermore, there is no doubt that medical activities have served as centers for anti-Turkish propaganda of a political nature.

Religious propaganda and proselytism do not bother them much, their main point in this connection being that, in the application of the principle of separation of church and state, religious instruction be not introduced into foreign schools, since it has been barred from their own. And, last but not least, Turkey has developed an intense spirit of nationalism, and its slogan of "Turkey for the Turks" is taken most literally.

One may gather from what I have said that the resident foreigner and his institutions are not welcome in Turkey, unless invited, and I believe that to be correct. Many relics, including hospitals, from the foreign communities under the capitulations continue their existence, but are continually harassed by officials striving to make them conform to their interpretation of the law and the new Turkish ideals. Several doctors have told me that the Turk would like to see them all depart, and there is probably something in what they say. The medical assistance he desires is what he will choose for himself and which he can utilize to his own ends. Practitioners from the outside, who are largely isolated among their own people and only encounter the Turk in encroaching upon his clientele, are not most desirable from his point of view.

I have never heard a Turk admit this antagonism—they are too courteous—so I do not know how widespread the feeling may be. And I must say that they must be good at dissimulation if the cordial treatment that I have received at the hands of most of them has been bogus. But, then, I was not practicing. The signs are to be seen, nevertheless, and the newspapers have recently devoted some space to the comments alleged to emanate from prominent Turkish medical men concerning what is described as financial exploitation of the sick by the foreigner.

The native non-Moslems (Greeks, Armenians, and Jews) find their path smoother than that of doctors from the Occident. They think along the same lines as the people of the country, understand them, and can work more harmoniously with them. But even at that, they are not decidedly popular, if one is to judge by the numbers that are encountered in Turkish institutions. I know of one or two Frenchmen in the medical school and an occasional Jew in Turkish hospitals; otherwise, so far as I know, the personnel is purely Turkish. Foreign institutions do have Turks on the staff, but I do not know to what extent this is the result of policy. In one medical society of mixed membership, I have encountered only native races, but I must say that they seemed to operate together

amicably, actuated only by their professional interest, and speaking French or Turkish as they desired.

The caliber of Turkish and foreign medical men in Turkey has impressed me as being first-class, but I have not encountered any whom I would consider as rivaling the leaders of the profession in western countries. Their work is well done, and they keep in touch with modern progress, applying its lessons to the best of their means and ability.

I am not aware of any important research work that has been consummated in Turkey. But one must bear in mind that during the past two decades which have been marked by such splendid medical expansion elsewhere, that country has been in the throes of revolution and war. Investigations have been conducted, as is witnessed by numerous articles published abroad (Germany, France, or England) and at home. The latter, however, are not often available to the medical world as they are usually published in the native tongue.

Our medical progress has been burdened with Latin and Greek, which still cling to our nomenclature, terminology, and prescriptions. Similarly, Arabic is the official medical language in Turkey. It looks much like Turkish to the uninitiated, but I am assured that such is by no means the case. The difficulties for the medical student are enhanced by reason of the fact that, although medical dictionaries do exist, they are antiquated and not generally available. He must absorb and retain as he progresses. It is also often difficult to express succinctly new medical terms and thought in Arabic. But, just as with ourselves, there is a marked tendency to escape from the burden as much as possible. In ordinary conversation and even in writing French or German names are extensively employed, as well as such Turkish words as will fit the case. In official correspondence, however, the Arabic still reigns supreme.

Of local medical periodicals, several can be mentioned. The Ministry of Health publishes a monthly *Annals of Hygiene*, pamphlets, and posters for popular use. Constantinople issues the *Bulletin de la Direction Générale de l'Hygiène Publique*. Others are the *Stamboul Clinic* (*Stamboul Seriryati*), the *Anatolian Medical Journal* (*Anadolou-Tib-Medjmouasi*), the *Bulletin de la Faculté de Médecine de Constantinople*, the *Military Medical Review* (*Djéridéi Tibbiei Askérié*), the *Gazette Médicale d'Orient* (*Bulletin de la Société de Médecine Turque*), and the *Hay Poujak* (an Armenian journal).

Medical societies exist, and I know of at least two in Constantinople. The *Société de Médecine Turque* has a membership composed of several nationalities, is over 70 years old, and was formerly known as the *Société Impériale de Médecine de Constanti-*

nople. I have attended some of its sessions, and found the atmosphere very homelike. The usual types of papers, with cases and discussions, were heard and seen. The most marked divergence from a similar occasion at home was the notable animation and general interest and discussion. Nobody seemed to be bored. Constantinople has at least one other medical society, the Société Amicale des Médecins Turcs, whose membership is purely Turkish. Both societies have distinguished Turkish medical men on their rolls.

An innovation occurred in 1925 when the Turks held their first national medical congress at Angora under the auspices and on the invitation of the Ministry of Health. Over 500 doctors were present, and the subjects set for discussion were malaria, tuberculosis in children, and the birth rate. It is planned to hold other congresses in the future.

Dentistry, pharmacy, and veterinary medicine receive attention, the national Government having schools for each, the two former being in association with the medical school. I am under the impression that the veterinary school is under the Army. I understand that a three-year course is given in the schools of pharmacy and dentistry, and that a fourth year must be spent in some hospital before a degree is granted.

The medical school maintains in Constantinople an obstetrical clinic that also serves as a school for midwives. The course covers two years, the first being devoted to academic studies, the second to the actual deliveries. Graduates must spend one year in a Government institution. There were about 200 women in training in 1924. Instruction is given by doctors, and no charge is made. The school is well installed and equipment seemed to be ample and satisfactory. It seems probable that these women are very well trained.

In the field of trained nursing, Turkey is woefully deficient, according to American standards. Her medical institutions lack the finish that only the touch of the trained nurse seems to impart and which means so much to the comfort and welfare of the sick. The nursing in some foreign hospitals is done by sisters of religious orders. The American Hospital of Constantinople has a nucleus of American trained nurses, and is making a serious attempt properly to train women of the country for the work, using them at the same time in the hospital. Robert College, an American institution at Constantinople, has American trained nurses in its infirmary. But, except for the American institutions, trained nurses, in our acceptance of the title, are not available, the nursing being done usually by those who have attained their proficiency by actual work with the sick under more experienced seniors; that is, by apprenticeship.

I must admit that some appeared to render excellent service and that all seemed to take a pride in and be conscientious about their work, but they usually fail in that excellence which comes from a proper nursing education.

The medical profession in the Near East is awakening to the need for adequately trained nurses, but, curious as we may consider it, I do not think that the majority of practitioners are really seriously concerned about the matter or realize the extent to which nurses of the caliber of ours, for instance, could lighten and render more agreeable their labors. The vital importance of the public health nurse is still less realized; but then, as noted elsewhere, efficient organization for public health work in the Near East is still in the nebulous stage. And this is the country where Florence Nightingale labored to such good purpose 71 years ago! Her quarters in the large Selimyeh Barracks are still shown to visitors.

There has been a weak attempt at training of nurses during past years in the obstetrical clinic of the medical school in Constantinople. It was my understanding that women could leave after the first or academic year and engage in nursing. Such training was something, at least, but in our eyes most inadequate.

The year 1925, however, witnessed the opening in Constantinople of what is intended to be a real training school. It is under the auspices of the Croissant Rouge (the Red Crescent—a society modeled after our Red Cross) and is for Turkish women of over 20 years of age, preference being given to orphans. The course covers two years, being preceded by a preliminary test period of three months, during which the adaptability of the candidates is determined. The students agree to serve five years with the Croissant Rouge after graduation. During the course their expenses (lodging, feeding, and clothing) are paid, and they receive a small allowance of money. The Hôpital des Pauvres (Hôpital Validé) and two other Turkish hospitals are utilized for practical work. Thirty students are to be admitted each year, and there were more than 150 applicants at the opening in February. I understand that the entering class comprised 25 women. The teaching is done by Turkish doctors and two trained nurses from Vienna direct the practical work.

The American Hospital of Constantinople has conducted training classes for nurses of all nationalities. The first class graduated in 1923, and the first Turkish nurse graduated in 1924. The course covers 28 months with a total of 902½ hours of actual instruction and is so planned that the diploma will be recognized by the nursing profession of America and Europe. No fees are charged and students are provided with board, lodging, laundry, uniforms, textbooks, and a small monthly allowance of money. Teaching is in English and is done by American registered nurses, by graduates,

and by doctors. The work has been well done and was intended to serve as the beginning of adequate training for nurses in the Near East, especially for Turkey. Distinguished members of the Croissant Rouge advocated utilizing the foundation already laid by our hospital in the formation of the new Turkish training school, but the majority would have none of it. Our graduates, though, have no difficulty in securing positions, even the Turkish institutions eagerly desiring those of their nationality. Unfortunately for Turkey, most of the graduates are not Turks and go abroad to work.

The problem of developing nurses of high caliber from the women of Turkey is not so simple as some may think. They have but recently emerged from seclusion and are but trying their wings. Few have reached the stage of self-reliance, independence of thought, and readiness to take the initiative that we find at home. They are still dominated by the male and have by no means convinced him that they are worthy of respect in affairs outside the home or are more than mere chattels. And the better class, from which material for the nursing profession should preferably be selected, are usually deficient in the preliminary education that a high-grade nurse must have. A large percentage of candidates from the better class apply for training merely for the sake of diversion and escape from the restrictions of life at home. I anticipate that many years will pass before Turkish women are providing from their ranks nurses who can be considered the equals of our own. They must learn to stand upon their own two feet and not be bluffed by the doctor.

A frequent criticism that I have heard concerning Turkish medical institutions is that they are dirty. I have visited many of them and wish to place myself on record as stating that I have not found such to be the case, and that, on the other hand, they have, practically invariably, been neat and clean. Although, by reason of age or lack of funds, their appearance may suffer and some might be called dingy or shabby, their orderliness and cleansing were thorough. Kitchens and outbuildings do not as a rule attain the immaculate condition found in our naval hospitals, but this is the result of age or construction and not of filth. I consider conditions to be surprisingly good when I recollect the two decades of revolution, war, and upheavals of population from which Turkey is emerging with but little in the treasury. Such installations as afford opportunity for flowers, paths, and gardening showed evidence of thoughtful plotting and care. The matter of plumbing, however, does afford ground for criticism by reason of odors. Modern plumbing, with fixtures, traps, and vents, is not so universal as with us.

The civilian medical institutions of Turkey, both foreign and native, have no ambulance service for accidents and sudden emer-

gencies such as we have at home. There are, of course, ambulances, but they are not kept on the *qui vive*. The sick and injured usually make the best of their way to the hospital.

A more vital deficiency is found in the field of dietetics. This, of course, is a phase of the nursing problem. So far as I know, the American Hospital of Constantinople is the only one that devotes adequate attention to the question. As a matter of fact, the native patient probably receives as much and as good (usually more and better) food as he does in his own home, but that can not be considered as meeting the needs of the situation. Kitchens are often primitive; the prepared food is usually carried considerable distances before being served, and in containers which protect it but poorly; service is unattractive and a special diet kitchen is a rarity.

Hospitals in Turkey are maintained by foreigners as well as by the Turks. Those of the Government are numerous and are under civilian or army or navy control. Many are also maintained by the municipalities. The foreign hospitals are supported by Governments, by the resident communities, or by foreign missions (American, French, and Italian). The activities of the last group are seriously embarrassed at present by reason of the lack of doctors who are licensed to practice in the country. Constantinople has also at least three small private hospitals—one Italian and two Turkish. Practically all hospitals have out-patient departments, and there are also dispensaries or clinics, both foreign and Turkish, that are not definitely connected with hospitals.

So far as I could determine, most civilian medical institutions, including the Turkish, are open to all races. Even the occasional exception will admit paying patients of another nation. Charges will be found to fit any purse and range from nothing to about \$10 a day. Most of the sick are treated free. One notable feature is that most hospitals have a dentist on the staff. I know of nothing peculiar about the Moslem hospital, except possibly that most Turkish toilets have the bowls sunken in the floor and it is necessary to squat when using them.

Foreigners having hospitals in Constantinople are Americans, Armenians, Bulgars, French, Greeks, Italians, Jews, and Persians.

The British maintained no hospital in 1925, as there were no active British medical men licensed to practice. Their Seaman's Hospital was manned by a Greek staff under special arrangement and was both a private clinic and hospital, incidentally caring for British seamen. Their St. George's Hospital was managed by nursing sisters and had a Greek staff. The Russian Hospital was closed.

My estimate of the beds available for the sick in the civilian institutions of Constantinople would be about 6,500—3,000 in the more than 12 Turkish, and 3,500 in the foreign (the Hôpital National

Grec supplying about 2,000 of these). In case of necessity probably 2,000 more could be easily secured by full utilization of space, equipment of the new Hôpital de l'Efkaf, and by the use of tents or shelters in those hospitals having spacious grounds, namely, Faculté de Médecine, Hôpital Gul-Hané, Hôpital Etfal, Hôpital Bulgare, and the Hôpital National Grec.

Most of the foreign hospitals are comparatively new and have modern furnishings. The Turkish usually suffer in appearance from age and lack of funds, but one does encounter among them strictly up-to-date construction and installation, as, for example, the Hôpital Djerrah-Pasha, the surgical building and obstetrical pavilion of the Hôpital Hasséki-Nissa, and the as yet unequipped Hôpital de l'Efkaf. The small Hôpital Persan was also very pleasing. The Moslem is aware of the deficiencies of his institutions, is in touch with modern progress in construction and equipment, and needs only money in order to make his as good as any other.

As regards the efficiency of these various hospitals, my visits make me feel that the sick can secure satisfactory treatment in any of them. They are good, even if they do not attain the magnificence and perfection of our newer ones. I visited one municipal hospital in Anatolia, and I did not consider its work up to the standard found in the Constantinople hospitals. I presume that here as elsewhere rural institutions are below metropolitan standards.

I hesitate to laud any one Constantinople hospital more than another. One's choice for one's self would be made on such points as the race with which one desires to associate, the language preferred, the practitioner whose personality is liked or whose special experience fits one's case, and upon the extent to which one demands comforts, special diet, or trained nursing. The westerner would doubtless choose the American, the French, or the Italian hospital, as being for him the most pleasant. For diet, the Jewish hospital might be added to those three. The American Hospital of Constantinople excels in its real special-diet service and in trained nursing. As regards the best specialist, he might be found in any hospital.

The public-health situation in Turkey is deplorable. Fortunately, the quarantine service is well organized and functions efficiently, but problems connected with disease ashore are approached most inadequately. There are no men trained in public-health work, no sanitary engineers, and, consequently, no definite public-health program. National and local authorities are concerned over the situation and labor earnestly to improve conditions, but the vicissitudes of political life destroy the continuity of the work. As would be expected under the circumstances, the results are poor,

and there is much waste of effort and money, the latter being especially regrettable in Turkey's present impoverished condition.

Before voicing too loudly our criticism, however, we might bear in mind that other civilized countries that have not been subjected for years to the disturbing conditions that have existed in Turkey, are just as deficient in public-health matters. Twenty years would cover our own real results in the interior in this field, and most of our progress is a matter of the past 10 years. Even now we have extensive regions that are practically untouched.

In this connection, the National Government devotes its attention particularly to quarantine and communicable diseases; the municipal governments to water and food supply, inspection and distribution, to sewerage, drainage, street cleaning, housing, etc., through their boards of health. Street cleaning in Constantinople is well done, but, excluding that and quarantine, the other national and municipal public-health activities are so generally open to criticism that details would be superfluous here. Some phases will be mentioned later under the discussion of individual diseases. I do not believe that anything material will be accomplished until trained men with sufficient funds at their disposal are secured to plan and direct the work, and until the populace is convinced of its importance by education to the extent that they will cooperate.

There is in Constantinople a group of organizations that are endeavoring, on a small scale, to combat infant mortality. These are the American Welfare Society and three Turkish societies (The Friends of the Poor, the Children's Protective Association, and the Croissant Rouge).

Our society is the residue of the Red Cross, which no longer operates in Turkey. It conducts a clinic in Stamboul, open to all races, and health classes for boys and girls in the American school in Guedik Pasha. The clinic operates along the usual lines with infants and children, and utilizes the senior student-nurses of the American Hospital of Constantinople for follow-up work in the homes. It does excellent work, is popular, and has a constantly growing clientele. The other three accept only Turkish patients, and do no follow-up work in the homes except such as is done by our student nurses, who are often loaned to them. They are older than our clinic, but, I am glad to say, all seem to work in amity with each other and with our clinic, utilizing the latter for help and suggestions. The clinic of The Friends of the Poor is in the uncompleted Hôpital de l'Efkaf, and is supported by private subscription. The Children's Protective Association runs the Goutte de Lait, is financed by private contribution, and receives some financial assistance from the Government. It has one of the graduate Turkish nurses from the American Hospital of Constantinople. Another will

go, as soon as she graduates, to the Croissant Rouge, which is a branch of the National Government, and assist their clinic in the same work.

The National Government operates in matters of health through the Ministry of Health, in addition to the customary activities of the army and navy. At the beginning of the nineteenth century problems of public health were in the hands of the sultan's chief physician and of the cadis (religious judges). One then finds mention of a ministry of sanitary affairs, which was absorbed first by the War Department (the Grande Maîtrise de l'Artillerie). Later, the Minister of Commerce had also the title of Minister of Sanitary Affairs. About 1840, public-health functions were confided to the Ministry of Foreign Affairs. There was a director of health during the last 10 years of the Ottoman Empire. The present Ministry of Health has been in existence for about four years.

The officials of the ministry are the Minister, the Undersecretary of State, directors of divisions, secretaries, etc. The divisions are those of accounting, personnel, hygiene (includes the maritime and quarantine service, and a bureau of specialists), vital statistics and propaganda, pharmacy and department of drugs, and that of social assistance (includes hospitals, asylums, etc.). A superior board of hygiene is directly under the Minister.

The monthly salaries, in Turkish paper pounds, of the officials under the Minister were:

Undersecretary of State.....	200
Director of division.....	120 to 160
Director of quarantine.....	130
Secretaries, etc.....	50 to 75
Health officer of vilayet.....	100 to 150
Health officer of kaza.....	60 to 75
Sanitary inspector.....	40 to 50
Midwife.....	about 50

The value of the paper pound fluctuated between 50 and 60 cents. The gold pound is practically of the same value as the pound sterling. The cost of living in Turkey is high, and, for approximately United States standards, was but little less than there. Although the Turk lives, as a rule, on a less expensive scale than do we, I understand many health officials are compelled to augment their salaries by engaging to some extent in private practice. This, of course, is a detriment, as the importance of their work calls for full time.

The administrative subdivisions of the country are the vilayet, the kaza, the nahié, and the keuy (village), each being composed of those succeeding. The nahié has 10 to 15 villages and there are 72 vilayets. It is intended to group the vilayets into 9 sanitary districts, each to have a full-time health officer. The national repre-

sentatives work with and through the chief local officials, namely, the vali of the vilayet and the kaïmakan of the kaza, and are responsible to the ministry for health conditions in their districts. They are in touch with the officials of the municipal boards of health. The vilayet has a national director of public health, who is a member of the local council. The kaza has a national health officer, who handles any medico-legal work and is the doctor of the national dispensary, a sanitary inspector, and at least one midwife, in addition to the local health officials. The nahié has a national sanitary inspector.

The medical institutions conducted by the National Government are those of the army, the navy, the Efkafe, the quarantine service, schools, hospitals, antirabies institutes, dispensaries, laboratories, and the Museum of Hygiene in Constantinople. It contemplates the establishment at Angora of a school of public health with an institute of hygiene.

I am not very familiar with the medical activities of the army. I know that it has many hospitals, among which it supports the Hôpital Gul-Hané in Stamboul, Constantinople, in which the students of the medical school must spend their sixth, or clinical, year. This 300-bed hospital is organized and administered particularly for purposes of instruction and appeared to discharge its functions well. The staff is now entirely military and is composed of 17 higher ranking officers and 40 assistants. There were 125 students in the 1924-25 session. They wear uniform and have the grade and pay of a *sous-lieutenant* during the school year, which is considered as military service. I am not certain, but I believe that the veterinary school at Haïdar Pasha, Constantinople, comes under the army.

The medical corps of the navy has 22 commissioned medical officers. They enter the service after the above-mentioned year in the Hôpital Gul-Hané. There is no dental or nurse corps. The male hospital corps has a training school in the naval hospital. The single naval hospital is in Constantinople, and is an excellent institution, with a capacity of 300 beds. The staff comprised six medical officers and a civilian dentist. There were six women nurses (civilians).

The Efkafe Nazareti (Ministry of Pious Foundations) finances many enterprises from its own funds, which are considerable and independent of the general national revenues. It maintains the 300-bed Hôpital des Pauvres (Hôpital Validé) in Constantinople, and contiguous to that has practically completed the construction of a splendid 500-bed hospital (Hôpital de l'Efkaf), but for some reason unknown to me has never finished and equipped it. It is regrettable, as the Hôpital des Pauvres is antiquated and needs new quarters.

The Hôpital de l'Efkaf is at present used for housing orphans and refugees and a Turkish charitable organization (The Friends of the Poor) conducts there a school and a clinic that devotes special attention to infants and children.

The quarantine service of Turkey has a rather interesting history. In 1819 cholera was transported from India to the Occident via Persia. The establishment of a light quarantine ("Légère quarantaine") to protect the Ottoman Empire was attempted in 1831. As the consequence of several epidemics of plague, regulations against plague and cholera were promulgated in 1836, and ships and passengers were taxed to provide funds. Then a Turkish quarantine council was established, and a school for the training of sanitary officials was created at Couléli, on the Bosphorus. Soon foreign specialists were attached to the council as consultants. The Conseil de Santé was created in 1839, with Turks and delegates from embassies in Turkey as members. It became the Conseil Supérieur de Santé de Constantinople about 1842, the name distinguishing it from the provincial Conseils Sanitaires. This operated until the abolition of the capitulations in 1914, when quarantine activities passed into solely Turkish hands, and it constituted an important barrier against transportation of disease from the Orient to the Occident. The Bosphorus and Dardanelles came under the control of the Commission Sanitaire Interalliée Maritime et des Frontières during the allied occupation after the World War. Since October, 1922, quarantine has again been in Turkish hands (Direction Sanitaire des Frontières et du Littoral). The mixed council had accumulated considerable funds during its existence, and its affairs were liquidated in 1925.

Foreigners voiced many qualms when quarantine activities were assumed by the Turks in 1922. But to date they have done excellent work which has received favorable comment even from mariners. The director of the sanitary service is an able and energetic doctor who is apparently devoted to his work. The organization and equipment seem, in general, good.

Lazarets are established at Touzla, Kavak, Smyrna, and Sinop. The one at Touzla is particularly good. It is planned to have others at Mersina and Trebizond, and on the frontiers of Bulgaria, Syria, Iraq, Persia, and Georgia. There are sanitary offices in 36 places, with doctors at 9 of them. The personnel of the service consists of 15 doctors, 66 sanitary inspectors, 15 disinfectors, and about 100 miscellaneous. About 10 students attend the two-year course for disinfectors at the school in Kavak and are under salary.

Schools of medical aspect conducted by the National Government include the Faculté de Médecine in Haïdar Pasha, Constantinople, with its associated activities; the school for veterinary medicine

already mentioned; a school for sanitary inspectors in Stamboul, Constantinople, with a two-year course and about 150 students; and another similar school in Sivas with about 50 students.

The Faculté de Médecine is a part of the Université Turque, and, as an example of the high standing of medical men in Turkey, it might be mentioned that the *recteur* of the university is often a medical doctor. Associated with it are, in Stamboul, the Hôpital Gul-Hané, the Obstetrical Clinic (school for midwives; medical students do obstetrical work there in their fifth year), and the schools of dentistry and of pharmacy. All have been previously mentioned. Estimates of the number of students of dentistry and of pharmacy varied, one source giving 300 or more in each school, and another about 500 in the dental. The obstetrical clinic had about 50 beds and was quite satisfactory.

I visited the Faculté de Médecine several times and was most favorably impressed with it. The École de Médecine was established about 1875 at Galata Seraï, Constantinople, later moved to Stamboul, and, finally, to Haïdar Pasha where it occupies the huge, spacious, and really fine structures built by the Germans in 1902 for use as a military medical school. I can not but feel that excellent medical training can be secured at this college. It is suitably housed and equipped, orderly, dignified, and the work that I saw, as well as the general interest and industry displayed by both students and faculty, was very pleasing. The faculty had about 100 members, of three grades; that is, professors, an intermediate grade, and assistants. There were 28 professors, of whom 14 (the "laboratory" group) are full-time. The "clinical" group were not full-time. The assistants numbered about 50. The course has already been outlined. Tuition is free. Students of all nationalities are accepted and there were about 450, including 25 women, in the session of 1924-25. The fifth-year class was composed of about 70. The college had been coeducational for two years, the enrollment of women for the first year under that régime having been five. I was told by one person that about 275 students were being trained for military service, while another said there were about 150. These military students wear uniforms, receive about 30 to 50 piasters (100 piasters make a Turkish pound) per month, and are quartered and subsisted in the college building. About 100 students have their expenses during the course paid by the Ministry of Health and receive five Turkish pounds per week, agreeing to work three years for the ministry after graduation. There is liaison between faculty and students by means of a student council composed of three members of each class.

It should be mentioned that the government, in order to provide doctors for the rural regions, requires civilian graduates of the

Faculté de Médecine to spend two years in Anatolia after graduation. The Ministry of Health assigns the location, and they receive a salary that is augmented 50 to 100 per cent if the locality is very undesirable.

Each department of the school is segregated and has its own offices, waiting room, small wards, examination and treatment rooms, and even a small laboratory for routine work. Surgical specialties have their own operating suites. There are a few private rooms for patients.

The teaching facilities appeared entirely adequate. There were plenty of good microscopes, excellent models and charts, apparatus, glassware, instruments, chemicals, etc. The department of anatomy is beautifully installed—well-lighted, good tables, charts, models, skeletons, dissections, preparation rooms for the staff, and museum. It secures ample material from the indigent dead, but, by reason of the lack of refrigerating facilities, must preserve it in liquid. Plenty of clinical material is secured in the large outpatient service, patients coming from all over Constantinople. The scattered wards contained about 350 bed-patients of various types. The library is large, contains many books (including a few American and English) and about 50 current periodicals.

Some of the hospitals dependent upon the National Government have already been mentioned. Others are the admirable 250-bed Hôpital Etfal at Chichli, Constantinople, for women and children, and the 100-bed hospital for contagious diseases in Haïdar Pasha, Constantinople. There are 150-bed hospitals, each with a staff of director and nine specialists at Angora, Sivas, Erzeroum, and Diarbekir, and a 50-bed hospital is being built at Zongouldak.

Antirabies institutes are in Constantinople, Sivas, Erzeroum, and Diarbekir and three others are to be established.

The National Government has a small tuberculosis dispensary in Stamboul, Constantinople. There are 110 dispensaries scattered through the country, primarily for antimalarial work, but not limited to that. Provision has been made for 150 in all. Each has a small infirmary of five beds, and the staff consists of a doctor (the health officer of the kaza) and a nurse.

Clinical laboratories are, of course, to be found as a part of other medical activities, but the state maintains certain special ones, namely, the Institut Bactériologique and its branch, the Institut Vaccinogène, in Stamboul, Constantinople; a chemical laboratory for examinations of a chemical nature in temporary quarters in Angora; and, I believe, a special laboratory at Sivas. While it is not beautifully housed or equipped, I was much pleased with the bacteriological laboratory in Stamboul. The staff seemed capable and keen, and the work was first class. It prepares diagnostic, prophylactic,

and curative vaccines and sera of all types, makes chemical and bacteriological examinations of the usual kind required in medicine, prepares quinine tablets, pursues original investigation, and gives a three-month course to graduates of medicine once or twice a year, the class being said to be usually about 30. The vaccine laboratory is small but very attractive. My only criticism of it would be that the stable was not so well kept as I should have liked. It prepares and distributes about 500,000 tubes of cowpox vaccine per year, each tube having enough lymph for about 10 vaccinations. The products of these laboratories are used for military and other governmental needs, but can also be purchased by civilians. They do work for municipal as well as for national institutions.

Vital statistics in Turkey are unsatisfactory. The national Ministry of Health and at least Constantinople, of the municipalities, publish statistics, but, for the foreigner, they are not continuous, nor are they complete from our point of view. Moreover, one receives but little satisfaction when inquiry is made.

The record of births and deaths is probably accurate, but the causes of death are registered in only the large cities. The public health personnel covers the ground, but I do not know whether the reporting of disease is so thorough as it should be; that is, that all cases come to their attention that should. I believe that the army and navy have complete returns, but I have never been able to learn to what extent or how they are analyzed.

The necessary statistical background of a census has been lacking, because there has never been an accurate national census in Turkey. Interfering factors have been indifference, originally, in all probability, the presence of large autonomous communities of foreigners, large fluctuations in population, change of frontiers, and war and revolution. The list of male Turkish subjects has probably been accurately maintained for purposes of recruiting, but I am not so sanguine concerning the females. A census has been authorized, and was started in 1925.

The Ministry of Health gives the population of Turkey in 1924 as 13,348,452, with a birth rate per 1,000 of about 10 and a death rate of about 8. This death rate would be a real cause for congratulation, rivaling, as it does, our best in the United States, were it not that others estimate the population as between 7,000,000 and 8,000,000. Such figures would still give the very commendable and more reasonable death rate of about 14. But I must confess that I consider that rate still too good to be true. The population of Constantinople is estimated as about 1,500,000 before the World War, and opinions concerning the present census vary between 500,000 and 1,000,000. The board of health and other reliable sources of information, however, give between 800,000 and 900,000,

and, on the latter estimate, the death rate per 1,000 for 1924 was about 17.

There are numerous mineral and thermal springs in Turkey, of which the best known are probably those at Broussa. One hundred and twelve have been listed and analyses have been made of the waters of many. Some are said to approximate closely the composition of the best-known health springs in Europe, and I understand that some Turkish springs have temperatures higher than any found in western countries. For many centuries they have been used for purposes of health and pleasure and there can still be seen around some of them the ruins of ancient and splendid baths. The baths that I have seen are not very enticing, being in decrepit structures and with few conveniences. They have no medical supervision worthy the name and are used practically only for pleasure.

Health conditions in Turkey are influenced not only by the lack of a real public health program and trained personnel, but also by the general poverty and lack of education of its citizens and the difficulty of communication. To these can be added the present stupendous exchange of populations. Constantinople has been overwhelmed with refugees during the past few years, the influx having been responsible for epidemics of smallpox, typhus fever, and relapsing fever. More than 300,000 Russians came in 1919, and still more later. Probably more than 150,000 Greeks and Turks arrived from Anatolia in 1921 and 1922. As the result of the Greek offensive and its repulse, about 20,000 Armenians came from Cilicia. It is remarkable that the health situation is as good as it is.

Situated as the country is, between the Orient and the Occident, and pierced by the great highway of the Straits, Turkey affords the natural route for the transportation of disease. This was especially true when the pilgrimages to Mecca made such free use of it. Its quarantine service is the barrier and Western countries should be glad that the service functions so efficiently.

The Ministry of Health is at present specially concerned with the problems discussed at the 1925 National Medical Congress, viz, malaria, tuberculosis, and infant mortality. More will be said of these later. The officials are firm believers in the preventive efficacy of vaccination and that for smallpox is routine and compulsory. Vaccines against typhoid fever, plague, and cholera are also extensively employed when the occasion arises and are then compulsory.

Turkey is not particularly characterized by unusual diseases. One encounters in the published reports of the Ministry of Health and of the Constantinople Board of Health just about what we do at home. Measles is very prevalent. It is said that scarlet fever

is not so severe as in western countries. Pappataci fever is common. One notes considerable typhus fever and relapsing fever. Trachoma is widespread, especially in Anatolia, and has done much damage. Cutaneous leishmaniasis (oriental sore) is encountered in Anatolia. There is much anthrax and some glanders among animals and human cases are not rare.

Malaria is the chief scourge of rural Turkey, which really includes all except Constantinople and Smyrna, the other towns not being large enough to make an unfavorable habitat for the anopheles mosquito. The Ministry of Health devotes particular attention to antimalarial work. Its dispensaries distribute quinine and are centers for propaganda. Campaigns against mosquito breeding are under way in some of the larger towns, especially at Angora, the national capital. There appears to have been a most pleasing reduction in mosquitoes and new cases of malaria during 1925 in that town. The Government realizes the need of a trained malariologist to formulate a balanced and economical campaign and is distinctly in the mood to make good use of the services of one. It is to be hoped that a competent adviser will be soon secured.

Quinine is a State monopoly and tablets are prepared by Government institutions, used for governmental needs, and available for purchase by civilians. Two thousand five hundred and fifty kilograms were distributed in 1924, and only 950 of them were sold, the remaining 1,600 having been free. Antimalarial work, including prophylaxis and treatment, is done in the schools, and the results of the examination of 3,034 school children of Angora may be of interest. One thousand one hundred and seven blood smears were examined and 209 showed malarial parasites (85 tertian, 76 estivo-autumnal, 16 quartan, and 32 not determined); 628 children had enlarged spleens; and 475 had fever within a few weeks of the examination. Marked improvement in health of the children has been noted since the administration of quinine was started.

Tuberculosis is widespread in Turkey and, except for occasional cases, most inadequately treated. Prior to the World War it caused about 2,800 deaths yearly in Constantinople alone, rising to about 3,500 during the war and falling to 2,231 in 1922. Incidence was higher among females, probably as the result of their secluded life. The only sanatorium of which I am aware is the small one maintained on the island of Halki in the Sea of Marmora by the city of Constantinople. I have heard that that city contemplates the building of another. But even then the important question of diet will not be suitably answered until trained dietitians are in the field. Advanced and usually hopeless cases at times reach the hospital to die; earlier cases are forced to combat the disease largely with the weapon of their own resistance, as no suitable facilities for treatment

are available to the physician. I was told at Broussa that tuberculous cervical adenitis was very common there, but that intestinal tuberculosis was only sporadic.

Infant mortality is high. It is estimated as about 40 per cent, increasing to even 80 per cent under especially bad conditions. This is probably not the fault of obstetrical attendance, as the Government midwives are well trained and physicians and hospitals are usually available. Its principal cause is doubtless to be found in the poverty and the ignorance that surround the infant after birth. The remedy will not be at hand until education, nutritional clinics, and public health nurses are common. Further comment will be made when venereal diseases are considered.

Rabies is common, and the Government maintains the Pasteur Institutes already mentioned. The one at Constantinople is 30 years old, has 40 beds, and is simply but effectively equipped, employing the method of Höyges as well as that of Pasteur. Forty individuals were under treatment at the time of my visit in January, 1924. Mortality is said to be very low. During the allied occupation of Constantinople, 1,700 patients applied for treatment between November 1, 1921, and November 1, 1922, and treatment was given to 899 who were considered to need it, with 11 deaths. The animals responsible for these 899 cases were dogs (767), cats (70), rats (28), wolves (9), men (5), donkeys (4), fowls (4), rabbits (2), monkeys, (2), horses (1), and sheep (1). One proved case was that of a rooster infecting a child. The disease is considered endemic amongst wolves and jackals here and they cause frequent outbreaks among dogs.

The rabies problem is complicated in Turkey by the Moslem faith which forbids the taking of life unnecessarily. During a rabies scare in Constantinople prior to the World War this stricture was evaded by deporting thousands of dogs to an arid, uninhabited islet in the Sea of Marmora, where the animals lived by devouring each other or died of thirst and starvation. In such fashion, the Turk avoided the taking of life. The dog population increased again during the succeeding years and the allied police destroyed 8,000 to 9,000 during 1922. The necessities of the situation are now recognized by the Moslem and officials destroy the vagrants.

Typhoid fever and dysentery are endemic in Turkey by reason of the lack of protection of the water supply and ineffective control of the disposal of dejecta. Constantinople has water conduits and good sources, but defects in the pipes expose the water, and cisterns and wells are common even in that large city. It has also excellent drainage into the rapid current of the Bosphorus, but the sewers are not well constructed, and there are many cesspools and privies. So every summer sees an epidemic of moderate, or, occasionally, large proportions. Typhoid vaccine is much used, but not generally, nor is it compulsory unless a large epidemic occurs.

Plague has occurred only sporadically during the past few years, the last considerable epidemic having been in 1902, if one excepts that of 1914-15 in Bagdad. The credit is doubtless due to the effective quarantine service and thorough local measures of isolation and vaccination when a case appears. The type is practically always bubonic, although five cases of pneumonic plague occurred in one family in Constantinople in 1925, and I was told by a bacteriologist that he had identified another case some years ago in a Constantinople hospital. Rat catching and examination is practiced, but I am told that the finding of a plague rat is a rare occurrence, the only instance of which I have heard being the identification of 3 such among 82 captured in Selimyeh Barracks during the outbreak there in 1920. One explanation may be that the cities are usually built on ancient ruins and the soil is honeycombed with remnants of passages, conduits, cisterns, etc., to which inaccessible spots the sick rat may retire to die. Or it may be that the ignorant class, among which the cases usually appear, dispose of the dead rats rather than be disturbed by sanitary measures.

Constantinople has had no case of cholera since the small outbreak among Russian refugees in 1920, and I am not aware of any having occurred elsewhere in Turkey. So far as I know, the last notable outbreak in the country was that of 1911 to 1913. Here again the quarantine service deserves credit, as the disease has occurred in the Near East, notably in Russia, and many carriers, as well as actual cases, have been detected and removed by the quarantine officials.

Venereal diseases are common and syphilis is said to be very widespread in Anatolia, especially along the Black Sea littoral. I have endeavored to secure accurate information relative to the prevalence of venereal diseases in Turkey, inasmuch as the Near East has long borne the reputation of being a hotbed of these diseases. As might be anticipated, my efforts were not crowned with success. Statistical data were not available, since, as in most countries, these diseases are not reportable. The military services may have data for males as the result of physical examinations for active military service, but they were not accessible nor am I certain that they are compiled. The result was that such opinion as could be formed had to be based upon hearsay—very unsatisfactory at the best. Turks were consulted, as well as medical men and civilians of other nationalities.

It is the general impression that Anatolia should be considered separately from Constantinople, by reason of the ignorance of the peasant in such matters. I have been told that the latter fears these diseases but little and, not uncommonly, will deliberately acquire disease in order to evade military service. Gonorrhoeal ophthalmia causes much damage.

As regards Constantinople and vicinity, it can be said upon the authority of medical men (one being a genito-urinary specialist) who have practiced in other countries as well as here, that venereal diseases are probably no more prevalent than they are in other countries of Europe, for example, France and Germany. If the experience of the U. S. S. *Scorpion* is to the point, it can not be denied that the admission rates for 1921, 1922, and for the first part of 1923, compare most favorably with those of the Navy operating upon our own Atlantic and Pacific coasts, and this in a city where sexual promiscuity is undoubtedly much greater than at home. Since the ship started cruising in 1923, admission rates in Varna, Bulgaria, and Marseilles, France, have been as high as any encountered in Turkey or Greece.

Prior to May, 1923, the U. S. S. *Scorpion* had not moved from the immediate vicinity of Constantinople for years. Then until October, 1923, she moved farther, but still near Constantinople. Finally, she reached Bulgaria on October 5, 1923, and since then has cruised extensively in the Mediterranean Sea and in the Black Sea. The crew included many men who had been aboard for years, and many who had married and had their families ashore in Constantinople. Most of the others had been on board long enough to have graduated from promiscuous sexual activities ashore and they probably found vent among those women whom they had found to be safe. The tabulation below shows the effect. Even the occasional return of the ship to Constantinople brought no amelioration of rate, probably because former sexual connections had been broken or the women had become infected in the interim. During eight months of 1922 there were no admissions for venereal disease.

APPROXIMATE ANNUAL ADMISSION RATE PER 1,000 FOR VENEREAL DISEASES

1921	1922	1923			1924	1925 (January to June)
		January to April	May to September	October to December		
140	75	90	250-325	425	370	335

Hospitals and dispensaries treat venereal disease, and the Ministry of Health stated that 21,843 cases of syphilis were under treatment during 1923 and 22,972 during 1924. Municipal institutions and private physicians, of course, also treat these diseases. Constantinople has a special hospital for them at Haskeuy. In addition to mercury, arsenic and bismuth preparations are used for syphilis, but I can not say to what extent. I understand that during the World War arsenicals, by reason of their scarcity, were largely reserved for relapsing fever. Medical prophylaxis is not employed

by the Government services. In the Army I understand that active syphilis is segregated in special duty units.

Prostitution occurs in Turkey and is legalized. Constantinople had 929 registered prostitutes in May, 1925, and the police are supposed to arrest those caught clandestinely practicing illegitimate intercourse and to register them. But of course there are many who escape detection. Those who are registered are examined twice weekly and treated if found infected. The officials probably do their work conscientiously, but it is well known that there are unscrupulous physicians who treat the women before their official examination so as to conceal active disease if possible. These practitioners are said to state that 80 per cent of the prostitutes they see have syphilis, but, of course, not all are in the infective stage. Official figures show 3 per cent of registered prostitutes to be infected and 60 per cent of those caught in clandestine relations.

In this connection, an article on syphilis in Turkey by Dr. Enver Bey in the Anatolian Medical Journal (*Anadolou-Tib-Medjmouasi*, 1922, I, 1) is of interest. He was *médecin-en-chef* of the Government hospital at Bolou, and he recounts his personal experiences of 13 years in the Anatolian regions where the disease is most prevalent. A certain German physician, Dr. Duhring Pasha, who had practiced in Turkey for many years and who had organized an extensive anti-syphilis campaign in Kastamouni, noted the prevalence of syphilis in Turkey and made the forecast that there would be serious effects on the race unless widespread and adequate treatment was instituted. Doctor Enver's article, which has received the favorable comment of other leading Turkish doctors, concludes that all cases with active symptoms should be treated, but that the effects of syphilis in Turkey are not so grave as in western Europe, and that the disease does not constitute so serious a public health problem as Doctor Duhring maintained. He suggests that western habits of living, especially the use of alcohol (the Turkish peasant is abstemious), may aggravate the damage there.

Doctor Enver bases his opinions essentially upon birth rate, infant mortality, and increase of population. The reader must comprehend that in Anatolia adjoining localities may remain isolated from each other by reason of difficulties of communication or racial differences, and thus provide instructive contrasts.

The nahié of Djidde has the same population as that of Hash-Alay. There is almost no syphilis in the former, but 30 to 35 per cent of the inhabitants of the latter are syphilitics, some villages being entirely so. From 1909 to 1914, Djidde had 2,893 births and 1,821 deaths, while Hash-Alay had 3,014 and 1,914, respectively.

Western statistics give the mortality, *due to syphilis alone*, among the children of syphilitic families as ranging from 42 to 96 per cent. Doctor Enver found the following mortality *plus crippling, and due to all causes*, among children of syphilitic families in Turkey:

Births in syphilitic families	Total births	Percentage of dead and crippled
980.....	3,293	43
15 (both parents).....	71	48
20 (mother only).....	79	44
7 (father only).....	23	30
21 (receiving systematic antisyphilis treatment).....	62	43
5 (receiving no treatment).....	21	32

Doctor Enver emphasizes, in connection with the last two percentages, that he is not suggesting the influence of treatment, but that syphilis is not the only important cause of damage at work. Two thousand three hundred and ninety-four births in 632 nonsyphilitic families showed a damage of 40 per cent. Apparently, then, syphilis does not produce so much injury to infants and children in Turkey as it does in western Europe.

Syphilis is very prevalent along the Black Sea coast of Turkey between Aksheshehir and Gerze, whereas it is rarely encountered in the adjoining parallel strip toward the interior. A 5 per cent increase in population (234,753 to 245,113) occurred in the former between 1906 and 1916, and a 2 per cent in the latter (151,171 to 154,536).

Doctor Enver also states that gonorrhea and chancroid were much less common in Anatolia than was syphilis, and that the spread of venereal disease was due to ignorance rather than to prostitution, there being much syphilis without prostitution, and vice versa. He has found the disease usually amenable to treatment, relapses being rare. About 35 per cent of syphilitics coming to his hospital were in the third stage, but many in the first and second stages never sought treatment. Third-stage syphilis was usually gummatous, the records of his hospital showing involvement of the nervous system in only three (they had a paralysis of the lower extremities) of 2,408 cases in the third stage.

COLOR BLINDNESS

By E. H. H. OLD, Captain, Medical Corps, United States Navy

This article is not written with the idea of setting forth any new facts in regard to color blindness, or discussing the many theories regarding the part played in this defect by rods, cones, rhodopsin,

and other optical agents, or whether it is a condition that should belong to the psychologist, physicist, or optical expert, but merely to relate the recent findings of the Permanent Medical Examining Board at the United States Naval Academy on making the regular annual physical examination of the first, second, and third classes, which include 1,117 midshipmen, and from these findings discuss the importance of this defect to the naval service and, to some extent, civil life.

The number of color-blind among males, as found on examination of different groups, runs between 3 and 5 per cent, while among females the percentage drops to about 0.1 or less. The following is quoted from Gatewood's Naval Hygiene to show the frequency of this condition among males, and the percentage from naval statistics:

"The regulations prescribe that color perception is to be always carefully determined and give in compact form the methods to be employed. But it is at least doubtful whether the method is well understood by all examiners. Jeffries examined 19,183 males and found 802 color-blind, or 4.18 per cent. A committee of the Ophthalmological Society of London examined 14,646 males and found 617, or 4.15 per cent, color-blind. It appears from combining these results that the percentage of the color-blind among males is about 4.16. It may be considered that the very pronounced or most dangerous cases from a service point of view are at least 3.5 per cent. But from an examination of the records of 16,747 persons who had been examined for first enlistment in 1895 and 1896 it appears that 511, or 3.05 per cent, were found to be color-blind. In 1905 there were 27,788 examinations for first enlistment, and 2.99 per cent were rejected for color-blindness, but 23 men were surveyed for color-blindness within six months of enlistment. In 1906 out of 29,765 examined for first enlistment about 3.1 per cent were rejected for color-blindness, but the number of subsequent surveys on account of color-blindness has not been obtained. And the number of color-blind persons who have passed examiners can not be measured by the number of early medical surveys on that account. The question of the detection of color-blindness by the prescribed test would therefore seem to be a suitable subject for elucidation, as the importance of excluding the color-blind from naval service is apparent."

In regard to the above percentages it is of interest to note that in the Baltimore Evening Sun of Saturday, December 4, 1926, there was an article quoting the findings of the aid to the Commissioner of Motor Vehicles of Maryland who examines applicants for license as regards color perception. This examination has been required for the past 16 months on account of modern traffic signals and is con-

ducted in Baltimore, but has not as yet been enforced in other sections of the State. This article states that out of 55,000 examinations only one woman has been found color-blind, while of men there have been 6 to 7 per cent. The high percentage found among males is of special interest, as the examination given is simply on flashing lights similar to those used for traffic purposes, and, in view of the large number of applicants, is most probably hastily conducted.

Paragraph 1419, Manual of the Medical Department (1922), reads in part as follows: "Color perception is to be carefully determined. The usual examination is by Jennings's self-recording test or by Holmgren's method. * * * The Stillings and Ishihara isochromatic charts, if available, should be used in cases where the applicants claim to be color ignorant and to detect malingering." On February 28, 1925, the following change was made by a circular letter issued by the Bureau of Medicine and Surgery: "The Stillings pseudo-isochromatic plates shall be used in cases where applicants claim color ignorance, to detect malingering, and for candidates for entrance to the United States Naval Academy. The Edridge-Green lamp shall be considered the qualifying test for all midshipmen and commissioned officers. Care should be taken to maintain a standard distance of 10 feet from the aperture of the lamp to receive equal intensity of illumination and the lights shall be recognized with the 2-millimeter aperture. The correct recognition of red, green, and white lights, especially when 'fogged,' simulates actual service conditions." This later was incorporated in the manual as an addenda to paragraph 1419, with the exception that the following was added, "doubtful cases should remain at least 12 minutes for light adaptation in the dark room prior to the test." The size of the aperture was later changed to read 2 centimeters instead of 2 millimeters.

The following is a part of the paragraph in Gatewood's Hygiene next to the one quoted above: "It appears that the frequent physical examinations at the Naval Academy have been sufficient, during more than 28 years since the Holmgren method was first employed in the Navy, to keep its graduates free from defective color perception. The test has been utilized to exclude a very large percentage of color-blind from the enlisted force. It can be utilized to exclude all from enlistment in any rating that can possibly be required in the performance of duty to recognize the color of lights or flags, or from enlistment in any rating which can furnish by *transfer to other ratings* any man required to do such duty. It would naturally seem that in a navy the question of color-blindness should only apply to the deck force, but it can not be said on enlistment just where a man is going to serve on a ship."

As required by Naval Academy regulations the annual physical examination of the first, second, and third classes has recently been

completed, and such a large number of these midshipmen have been found color-blind that it is considered of great importance that this possible defect be brought up for discussion and means considered whereby more thorough examinations can be given regarding color perception prior to admission to the Naval Academy and enlistment in the Navy. Of 1,117 midshipmen examined, 33, or 2.95 per cent, were recommended by the Permanent Medical Examining Board, composed of six medical officers stationed at the Naval Academy, to be rejected on account of color-blindness. On comparing this percentage with that of 2.99 per cent obtained in 1905 out of 27,788 examinations for first enlistment, as noted by Gatewood, it would seem that the percentage now in the academy, after supposedly passing a rigid examination, is as great as those rejected on examination for enlistment that year.

When the present first class was examined for admission the Holmgren test was required, but the second and third classes had the Stillings plates, or were supposed to have had them, though the different percentages found in the several classes would not tend to show the improvement that should have obtained. In the first class, of 589 examined, 15 were found color-blind, or 2.45 per cent. In the second class, of 212 examined, 9 were found color-blind, or 4.24 per cent. In the third class, of 316 examined, 9 were found color-blind, or 2.84 per cent. In addition to the 33 mentioned there were three others who showed a slight defect on examination by the plates, but as they passed the lamp test they could not be rejected. While these men read the lamp colors correctly, yet they did not do so with the promptness that should be required. This condition is exactly the opposite to Gatewood's optimism regarding midshipmen "during more than 28 years since the Holmgren method was first employed in the Navy," as quoted above.

As has been mentioned, the regulations now require that the Stillings plates be used for candidates for entrance to the Naval Academy. Unfortunately, but apparently necessary from an economical standpoint on account of travel expenses, a large number of candidates are given their physical examinations by various boards of medical examiners at different naval hospitals, navy yards, and stations. It would seem that this test could be given without a defective being passed, as it is so simple and accurate; but that in this, as in other requirements, there is no certainty that regulations have been followed, was shown last summer when two candidates who showed a defect on reporting here stated they were not examined by Stillings plates but by Holmgren's test. It should be mentioned here that when a regular board of medical examiners passes a candidate the Permanent Medical Examining Board has no authority to reject him when he reports at the Naval Academy; they can reex-

amine, but, if a very apparent defect is found which undoubtedly unfits a candidate for the naval service, he has to be ordered before a board of medical survey before he can be dismissed or requested to resign. In consequence of this a more or less superficial examination was given those candidates passed by other boards on account of the many examinations that have to be held each day when the new fourth class begins to report in June, and the color sense was not determined; but this examination was made last summer after the rush subsided, and already it is known that there are three in that class defective; how many more there are will be unknown until they have their regular annual physical examination next fall. Because of having been so recently admitted the entering class is not examined again until the following year. When the class of 1931 reports next June it is determined that those examined elsewhere be given a color test, together with the few other essential examinations always given, in order to eliminate that class of defectives as soon as possible, and in this way try to put a check on what is apparently a potential danger.

A candidate for the Naval Academy, passed by a board of medical examiners, or the Permanent Medical Examining Board, is only required, according to the instructions quoted above, to pass thereafter the Edridge-Green lamp test for color perception, which is also the requirement for officers on promotion. On account of the large number of examinations that had to be conducted, 1,117, and in order not to interfere with recitations more than was absolutely necessary, the Stillings plates were first used and those who read them without hesitation were passed, and the lamp not used. All who failed, or were seemingly uncertain, on the Stillings were then checked up by the Ishihara, and later examined by the Edridge-Green lamp as required. When the lamp test was used there were always four or five medical officers in the dark room to watch the test, and in each instance of the 33 rejections mentioned there was an unanimous vote. In other words, the defect was very apparent to all. This method is also used when conducting the annual physical examinations of the many officers stationed at and in the vicinity of the Naval Academy, about 250 to 275. It is of great interest to note here that when this examination was conducted in January, 1926, 4 officers out of about 250, or 1.6 per cent, were found distinctly color blind; of these there were two lieutenant commanders, one lieutenant, and one lieutenant (junior grade) two of whom have been retired since then by reason of this defect. How many more defectives of this type are already in the Navy can only be determined by requiring all boards making the annual physical examinations of officers to pay special attention to determination of color sense, and this also to be more carefully noted on all examinations for reenlistment.

The first essential in determination of color sense is that the examiner himself be assured that he is normal in this respect; otherwise the examination he conducts is worthless. To subserve this purpose all candidates for admission to the Medical Corps of the Navy should be given a very rigid examination on color perception, and anyone with the slightest defect should be rejected. The great value of a medical officer having perfect color sense is not only to be weighed by the fact that he has to conduct this examination on others, but it must also be considered that defective color perception would unfit him for many of his professional duties, especially in the use of the microscope for examination of stained smears, and in the examination of a patient for different colored rashes, papules, etc. As regards this defect when using a microscope, the writer, when an interne in one of the civil hospitals in New York, was associated with a physician who could never see the eosin stained tubercle bacilli in the methylene blue field, and he could not make differential counts nor interpret malarial smears. In the introduction to a recent book on Color Blindness by Dr. Mary Collins, of Edinburgh University, there is mentioned the case of a physician, found color blind and ignorant of the fact, who stated he had never met with a case of scarlet fever, and it can be readily understood how one with this defect would say the same thing of erysipelas, lymphangitis, rose spots of typhoid, and many other like conditions where a true sense of color is required for aid in diagnosis.

Some years ago when talking to an officer of the Medical Corps of the Army, he asked why we required one of our corps in the Navy to have a normal color sense, the question being asked, if I recall correctly, because a graduate in medicine rejected by the Navy had been accepted by the Army. My answer was given as related above, and I believe this can be said to apply to all who think of studying medicine; furthermore it would not be amiss if a determination of color sense were required before one is allowed to begin a medical course at college, as a marked defect of this nature would be a severe handicap throughout a medical career.

As regards the line officers and midshipmen, who are all prospective line officers, it is essential that they have a normal color sense, as otherwise they are a danger to all who serve on a ship with them and trust them for proper navigation. In addition to not being able always to read lights accurately under normal weather conditions, or when dimmed by fog or smoke, an officer with this defect is incapacitated in regard to reading signal or other flags, different colored buoys, colored charts, maps, etc.

As regards the remaining officer personnel, it is believed that they should also be required to have normal color sense. Though they

are not required to assume the great responsibility of interpreting navigation lights, etc., yet, in their ordinary duties, they are required to interpret colors. The supply officer is responsible for different colored clothing, bunting, etc., and purchasing of provisions in which the color index enters to a great extent at times. He is also used on some ships during general quarters and at target practice as a "spotter" or in the plotting room. Especially is this liable to be the case with a graduate of the Naval Academy commissioned in the Supply Corps. One with defective color sense would be useless in reporting colored splashes, or in the use of different colored headed pins in the plotting room, which, it is understood, are sometimes used. It is believed that the naval constructor and civil engineer, and undoubtedly officers in the Marine Corps, likewise have need of this sense in their different duties.

It would seem that among the enlisted personnel the deck force would necessarily be the only rating that should have a normal color sense, but, as noted by Gatewood, there are frequent transfers from one rating to another, and to offset a possibility of one with defective color sense being transferred to the deck force they should all be excluded at time of application for enlistment. The hospital corpsmen should undoubtedly have normal color sense, as perception of color is very necessary in their work, for the same reasons enumerated for medical officers.

The actual cause of color blindness, from anatomical and optical standpoints, is still a question, though there are many theories on record; but the discussion of them is foreign to the purpose of this article. It may be congenital or acquired, partial or total. That heredity plays a part in it is apparently without question, and, like hemophilia, it is passed on through the females of a family. It is acquired, among other predisposing causes, by disease of the optic nerve, overindulgence in tobacco, and injury to the head sufficiently severe to cause concussion. Total color blindness is rare; these unfortunates see no color at all and are practically blinded by bright light. The partial color blind may be either red-green blind or blue-yellow blind. While the former are the class dangerous from the naval service standpoint, on account of navigation lights, yet on account of the various colors used in flags, colored maps, etc., it is believed that one defective in the blue-yellow group should also be excluded.

In regard to which is the best test for color sense, and the one most readily adapted to naval usage, it is believed that we are approaching a standard that will more thoroughly eliminate the color blind than has been the case heretofore. The question that always arises in regard to such standard is the degree of imperfect color perception that is considered sufficient to unfit a man for naval service, as there are so-called borderland cases which are subject to

dispute and who, when examined by different boards, will show a decided imperfection before one and very slight before another. In defective vision we have a standard that can be fairly accurately measured, and the cause definitely determined, but in defective color perception the standard will have to be gauged by the candidate's ability to read certain colored plates or name colored lights, and the determination of the correctness or incorrectness of his answers is entirely dependent on what he sees as compared to the same perception on the part of his examiner or examiners. It is not believed that it is advisable to establish a permissible degree of error in regard to this sense as is the case in regard to defective vision, but that a man who fails on the standard test adopted be absolutely rejected as a candidate for midshipman or enlistment. For one to plead color ignorance, or any other such alibi, should not be considered, for if a man possessing the educational qualifications required to enter the naval service has not learned the names of the ordinary colors of the spectrum and acquired the ability to recognize them, his power of observation is so inferior that he would most probably be found deficient in other essential qualities.

Holmgren's wool test, with its various colored skeins, has been used in the naval service for about 40 years. This test is an excellent one, provided the skeins are not faded or discolored from constant handling, if used properly by the examiner. Unfortunately in this, as in other tests, the personal equation of the examiner is a most important factor, the essential requirements being that he have a normal color sense, and then that he know how to carry on the test. The latter requirement is believed to be rarer in the naval service than the former, and the reason why all defectives of this class have not been discovered. This test, which is thoroughly explained in Gatewood's *Naval Hygiene*, is valuable in that it can be done quickly and one can examine for knowledge of colors as well as detect those who are deficient. Those who are markedly red-green blind are readily detected, and such cases have been generally excluded, but those with lesser degrees of deficiency have been accepted here and there. It is very desirable for an examiner to have this set of skeins at hand, for in the cases of some defectives who seem to be answering against the rule in other tests, and in border line cases, they are of great value in making or confirming diagnoses. Like other tests it can be learned, especially if a candidate has access to the set by which he is examined, consequently this factor has to be always borne in mind. It is hard to understand how a midshipman, first class, examined by this test ever was passed as a candidate. On his annual physical examination held this month, the one to determine his physical condition prior to graduation and being commissioned, it was found that he could not read accurately

all the Stillings and Ishihara plates, so he was given the Edridge-Green lamp test as required. He called all the green lights "blue," and persisted in this even after he was shown a blue light and told that was "blue." He called the red and white lights accurately. Having a Holmgren set of wools at hand he was tried on them and failed absolutely, but what was most surprising was that when the red skein was put out to be matched he not only put in dark brown skeins but also dark blue.

Jennings's self-recording test is used as the alternative of Holmgren's. It is valuable in its way, in that a definite record is made of the candidate's examination, and the errors can be readily seen by the examiner whether he have a normal color sense or not, for the chart is marked and the perforation is simply in the proper square or it is not. When using this test care should be taken to renew the set as soon as the small colored patches of wool begin to fade. The record obtained is useful in that it is permanent. Like others, it can be learned.

Stillings's pseudo-isochromatic plates have been introduced for naval usage during the past two years and are now the requirement for admission of candidates to the Naval Academy. The plates consist of colored numerals on a colored background and there are 12 groups with two to four plates in each group. A brief description of the plates, and what can be determined, is given as an introduction to the book. The nomenclature of colors does not enter into the examination at all, the simple requirement being the correct reading of the numerals on the several plates. One with a normal color sense can read these numerals rapidly, shows no hesitation or doubt as to what he sees, and has the appearance of absolute confidence in naming them; while the man with defective color sense presents a different attitude by displaying hesitancy, studying the plates carefully, desiring to trace the numerals or hold the book at different angles to change the luminosity, etc. Those with a very marked defect will fail on practically every group, with the possible exception of the last two groups, which should be read by all and are put in for demonstration or testing for possible malingering. From complete failure there are degrees extending down two or four groups. This book is an excellent one, and in the hands of the general examiner is by far superior to the Holmgren and Jennings's tests. The examination is quick, as the candidate should read the plates rapidly; when read slowly and with hesitancy, turning the book one way or another for varied luminosity, a check should be made with another test. Most unfortunately this test, like others, can be learned and there is fair evidence on hand to believe it has been so learned by a few midshipmen so as to enable them to pass this test, though they could

not pass others which should be simple to one who has the color perception correctly to interpret these plates.

These books are readily procurable by anyone who wishes to purchase them, and, with a little instruction, can be so learned that the numerals can be called off by one who can not really see a single outline. There is good reason to believe that this can be done even though the book be cut up and the plates changed into different positions and presented separately. In order to show to what extremes one will go in order to deceive the examiner, in hope thereby of remaining at the Naval Academy and graduating, never considering at all what it would mean for him to be on the bridge at night and responsible for the many lives down below, a midshipman who was known as somewhat deficient was apparently reading the Stillings plates correctly, and surprisingly so, when the examiner happened to glance behind him and saw a much smaller man there who was also looking at the plates and as the pages were turned he was punching his large friend in the back and thus signaling the figures; it was noticed he was stumped, however, when a zero was turned. It is hoped that some method will be devised whereby this book, or its plates, can be made unlearnable. It is believed that possibly two or three sets of plates, with different numbers on the same background, would subserve this purpose, especially if the extra sets were made for naval usage only. As Captain Grow, of the Medical Corps, so thoroughly came to our aid in devising his unlearnable vision test chart, so may we hope he will give us aid in this.

Ishihara ischromatic plates, made up on the order of the Stillings, are very valuable to use as a check on the latter. At present this book is rather rare, and recently, on trying to obtain a new one, we were told that they were no longer being printed and could not be purchased in New York. This rarity adds greatly to their value, and this was demonstrated recently when a midshipman who could read Stillings, and was thought to have one of those books, failed on Ishihara and on the Edridge-Green lamp.

Edridge-Green lamp.—This test is, for practical purposes, the best so far devised, and may be considered the final court of appeal. By it you can detect the color-ignorant as well as the color-blind. It avoids all possibility of coaching and all failures can be put in the "dangerous" class. Of the numerous tests used and studied by Dr. Mary Collins, as mentioned in her book, she considers this test superior to all others. It is certainly the most practical from the service standpoint, and this, or some of the similar lamps, should be considered so for all merchant marine, railroad, and traffic signal examinations. By it actual white and colored lights are shown and the variations, as occur when masked by fog or smoke, can be simulated. It is easier

to convince a man that he is color deficient by this test than by others, and especially a parent or interested friend, providing he is not also deficient. At the Naval Academy only the red, green, and yellow lights are used. Any confusion of these colors, especially when the candidate has failed on Stillings and Ishihara, is considered a cause for rejection. It is noticed that those who have a marked deficiency will call a bright red "white" and sometimes "green," yellow and white "green," when suddenly turned on after a series of reds, light green "white" and yellow "red," after passing through shades of green, and can not see the very dark red. Those who show a less degree of deficiency on Stillings and Ishihara are observed to call the white "green," after a series of reds, especially the fogged white, the light green "white," and the yellow "red," after a series of greens. The examination is made in an absolutely darkened room, using the 2-centimeter aperture at 10 feet. As mentioned early in this paper, according to instructions in the manual, "doubtful cases should be allowed to remain in the room for 12 minutes before being examined." It is not believed this should be required, for certainly one on the bridge would not always have such opportunity to adjust his eyes to darkness, as he might be studying a chart by an electric light and from that immediately have to look out into the darkness to observe different lights. In regard to this the following paragraph in the newspaper article mentioned above was read with interest: "Color-blind persons examined in Baltimore are permitted to drive automobiles in daylight only when they first receive their license cards. Later, sometimes, this restriction is modified." Why this exception is made can not be understood, as it is apparent to anyone who drives a car that traffic light signals are used in daylight as well as at night practically everywhere, and as the luminosity is naturally diminished in daylight it is not unreasonable to presume that the color-blind would be even more liable to make an error during the day than at night.

Like all other tests, this one requires knowledge of execution and interpretation. The manner of using it should be approximately standardized, which can best be done by practical demonstration, but on account of the wide separation of the naval hospitals and stations equipped with the lamp this can only be done by a written description approved and issued by the Bureau of Medicine and Surgery.

The question of color blindness has reached an importance to-day that was never anticipated a few years ago. Heretofore it was considered of importance only to those engaged in marine and railroad work, which meant that a small minority of people were examined for this defect. To-day, with traffic signals of red, green,

and yellow lights found practically everywhere, directing the ever-increasing flow of vehicles, both day and night, and with a large majority instead of a small minority interested either as drivers or passengers, a great change has taken place, so that the color blind generally should be classed as potentially dangerous. It is not known by the writer how many States are requiring an examination for color sense by ability to read correctly and promptly the regular traffic signal lamps, but this should be a universal requirement. It is believed that its importance is sufficient to warrant an examination of all school children regarding their color sense, in addition to the other physical examinations required, those deficient to be so informed and told what it may mean to them regarding certain occupations later on in life.

It is very trying to have a candidate for midshipman report at the Naval Academy for examination, one who has looked forward to a naval career for some years, and then be placed in the position of having to reject him on account of color blindness, a condition of which he was totally unaware; the disappointment shown at times is very great, and would never have arisen if the candidate had been examined as a young boy and warned as to the future. We have had several boys brought up for preliminary examinations, prior to entering one of the preparatory schools for the service, who have been found color blind, and thus their parents have been able to direct their course along other lines before they reached the stage of disappointment and expense of special instruction. A definite percentage of the color blind can never be determined, any more than is the case with any other physical defect, as the examinations given will vary and depend to a great extent on the personal equation of the examiners; but it is believed that a greater number exist than are estimated by the statistics given in the first part of this article, and instead of being from 3 to 5 per cent will be found nearer double that number.

In regard to the standardization of the test or tests that should be instituted in the examination of the naval personnel, the present regulations should be revised and a more definite procedure outlined, at the same time calling to the attention of all examiners the apparent increase in the number of men who show this defect and the fact that they are being allowed to pass the entrance examinations for the service. It is realized that these examinations are made under varied conditions and that it is not practical to equip all ships and recruiting stations with the Edridge-Green lamp, for instance, but all can have Stillings's plates, Holmgren's and Jennings's tests, which, if properly used, will serve the purpose desired. At recruiting stations and other places, instead of starting with the

Holmgren's or Jennings's tests, as outlined in the manual, it is advised that the Stillings plates be used first and that the other two mentioned be later used for a check if desired. The Ishihara plates, if on hand, are most valuable for a check on the Stillings.

All naval hospitals and stations should be equipped with the Edridge-Green lamp, as well as with the other tests mentioned, and all officers should be examined by the lamp when they appear before boards at those places for their annual physical examination. As it would not be practical to equip all ships with the lamp it means that at least when officers are on shore duty they receive this test, though it is not practical for them to get it when at sea; thus they will receive it every two or three years. It is recognized that color-blindness can be acquired, therefore because a man has been accepted as with normal color sense does not mean that he will always retain it. Prior to using the lamp it is more convenient to use the Stillings plates and if these are read promptly it is almost a waste of time to go through the lamp test. This statement could be made an absolute one if it were not for the fact that those tests can be learned; if an unlearnable test, or set of tests, could be made this factor would be eliminated.

In regard to candidates for admission to the Naval Academy, the present requirements would be satisfactory if carried out properly, and especially if an unlearnable set of charts were devised. It is recommended that, if possible, all the boards of medical examiners which may be appointed elsewhere than at the Naval Academy for the examination of candidates be composed of medical officers on duty at naval hospitals and that, in addition to Stillings, the candidates be required to pass the Edridge-Green lamp and thus be placed, in so far as color sense is concerned, on the same status as officers. It is believed most important that a high standard be maintained in regard to this defect at time of admission into the service, and that not only the markedly color-blind be rejected but that all those who show an undoubted deficiency be also excluded, for the so-called border line case is just the type that is constantly giving rise to debate at each examination and his condition may be one that is increasing so that in a few years he would be placed in the dangerous class and retired; in the meantime, as a watch officer, he has been at times responsible for the lives of a number of people who were fortunately blissfully ignorant of his physical unfitness for the important duty assigned him.

Addendum.—Since the above was written the annual report of the Surgeon General, United States Navy, for 1926, has been received and the following paragraph on page 22, showing the findings on the annual physical examinations of officers, is quoted, as bearing on

some of the remarks made in this article regarding the reason for more rigid requirements in the examination for color perception:

Ninety-three officers (0.98 per cent) showed some degree of defective color perception. In the case of line officers an effort was made to have the defective vision tested by the Edridge-Green lamp, in order to determine whether the degree of defective color perception was sufficient to interfere with the performance of duty.

ETIOLOGICAL FACTORS IN THE PRODUCTION OF MAXILLARY ANTRUM DISEASE¹

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In general, two great divisions of these factors may be made and alone are commonly considered—namely, invasions from the nose and from the mouth. This is more applicable to the infectious cases and does not take into consideration contributory factors which may predispose the antrum to disease, and which may even render it impossible for the antrum to escape disease, while the other sinuses remain free.

In this paper we shall consider the influence of embryology and development, which determine the later anatomical features, and the deformities which tend to prolong an antrum infection. The bacterial agents must be considered. The flora found in infections of dental origin differ somewhat from those bacteria usually present in the infections of nasal origin, although any bacteria normally or abnormally present in the mouth or upper respiratory passages may be found in the antrum. The influence of trauma must be considered, especially the trauma necessary or unavoidable, as the case may be, in extractions of those teeth which are in proximity to the antral floor. The question of bathing infections has assumed a considerable import with the great increase in this pastime. Diet and its manifold ramifications enter the field of vitamins, and the associated problem of the mineral salts exert a not-to-be-overlooked influence in the production of maxillary antrum disease. The malignant and nonmalignant neoplasms are a very troublesome element to be considered and, in the case of the sarcomata and carcinomata, leave us only a feeling of chagrin at their almost inevitably fatal outcome.

To all these factors may be added the rarer involvement direct from the blood stream, as a part of a generalized septicemia when the antrum is involved, either alone or as one part of a large number of similar conditions. The question of osteitis and osteomyelitis is more complicated in the case of the antrum than in any other struc-

¹ Read before the sectional meeting, Cumberland, Md., 1926, American College of Surgeons, and before the northern Virginia, southern Maryland, and District of Columbia Medical Society and the National Capital Dental Society.

ture. We have a large cavity exposed to the air, lined by but a thin membrane, shaped like a pocket or reservoir, with the normal ostium near the top and not near the bottom, as it started out to be, its floors frequently in direct contact with several teeth, the roots of which may even penetrate its bony wall. These teeth are subject to the stress and strain incident to their proper function; in no place can a more fertile field be found for the low-grade types of bone disease. This bony change is, to a certain extent, physiological, inasmuch as it occurs throughout life, and, finally, in the aged we find that such a rarefaction of the floor has taken place that a remaining tooth may project high into the widened antral cavity.

The primitive maxillary sinus is a pouching of the mucous membrane on the floor or lateral wall of the ethmoidal infundibulum. This pouching may be duplicated, which explains in later life the occasional doubling of the sinus or the finding of incomplete septa, which may be the result of an incomplete fusion of two pouches. According to Schaefer, this indentation is present some time about the seventieth day of fetal life. At the time of birth, it is found that the slit is not in contact with the orbit but along the membranous lateral wall of the nose. It extends laterally and below and, at the end of the first year, it extends beneath the orbit in about the position of the infraorbital canal. At the end of the twentieth month it has elongated so that it extends above the rudimentary first permanent molar tooth. The position of the ostium does not change. In the adult its location corresponds in place to the primitive maxillary pouch. This is the beginning of the trouble with the antrum. Accessory maxillary ostia are, as a rule, beneath the middle turbinate and not offer much assistance in drainage.

At this juncture, it is well to note the opinion of the anatomist Schaefer in respect to exploring this sinus through its normal aperture. He feels that where it has been entered successfully it is more than likely that an artificial opening was made through the undefended floor and lateral wall of the ethmoid infundibulum. Anatomically, in later life, there are encountered the various incomplete septa, the extensions of this sinus into the alveolar process by a continuance of the normal rarefaction and absorption of bone, the alveolar recess; an extension under the floor of the nose extending, in some cases, almost to the nasal septum, the palatine recess, which prevents the proper ventilation and aeration and precludes the escape of secretions from the antrum, as well as extraneous fluids which may have been introduced. The palatine recess particularly is an important factor in disease, for an occasional drainage of the alveolar recess can come about by dental extractions opening this pocket, but, outside of a radical antrum operation, nothing can reach and drain the palatine recess. The question of anatomy is closely

woven into that of deformity. Even when normal, there are features that permit extensions of suppurative processes, the descending infections; the accumulation and deflection of drainage from the ethmoid and frontal into the antrum, particularly if there are any malformations of the middle turbinate. It is difficult to determine just what constitutes a deformity. Deflections of the nasal septum, and with this there is usually a compensatory hypertrophy of the middle turbinate, are so common that Sluder, after the examination of many skulls, prehistoric and modern, came to the conclusion that deflection is the rule. It certainly is present in the great majority of cases to come into the hands of the rhinologist, that is, in the white, high-nosed races. Of interest along that line is the observation that a true sinusitis is relatively rare in the negro, who certainly is not exempt from affections of the upper respiratory tract. He shows his full share and more of the osteitises, syphilitic osteomyelitis, and the presence of polypoid degeneration. The teeth of the present generation of the town negro are certainly not superior to those of the white, no matter what those of the previous generations have been. Work in any clinic will soon show the most wretched conditions and foul mouths among the negroes that can be imagined, and leads one readily to believe the old legend about the bite of the blue-gummed negro being always fatal.

Possibly too much stress has been laid on the question of septal deflections, but, as an etiological factor, they do have a bearing and must be considered. Atresia of the anterior or posterior choana certainly interferes with the aeration and ventilation of the sinuses, and, in case of the posterior atresias, are probably congenital and are due to persistence of the buconasal membrane. Formerly, when a great deal of cauterization of the turbinates was the vogue, great masses of scar tissue were frequently seen, and caused marked obstruction of the nasal chambers.

The discussion of the relative importance of nasal route infections and those from the mouth still rages. While the older figures, which took into account but few dental infections, are undoubtedly wrong, the practice and experience of the individual naturally tends to mold his opinion. If one has a great deal of work referred from surgeon dentists, he is apt to find this source of infection of much more importance than he was led to believe, especially in the cases requiring operative interference in order to effect a cure. According to Skillern, the antrum is more often diseased than its fellow sinuses, because of the added etiological factor, the relationship of the antral floor to the roots of the teeth. He believes, however, that direct extension from the nasal mucosa is the most frequent cause of maxillary sinusitis. This direct extension from the inflamed and

swollen mucosa extends to the ostium and sets up more or less inflammation.

The pathology of antrum infections is not very complex. With the primary invasion, no matter what the cause, there is, of course, hyperemia of the lining membrane, with the resultant production of hyperplasia which may continue or clear up if aeration, ventilation, and drainage are established. Otherwise, edematous changes take place, the membrane becomes thickened and papillomatous, glands and vessels may become atrophic, or, in other areas, dilated and form retention cysts. The ciliated epithelium may, in part or in whole, be infiltrated with round cells, the cilia destroyed, the epithelium changed to the pavement form and detached from the bone, or ulceration may occur and a rarefying osteitis or even a necrosis result. With direct extension from the inflamed and swollen mucosa of the nasal chambers through the ostium, this takes place readily. It subsides when the generalized infection of the other mucosa subsides, unless drainage has become markedly impaired. The cilia, unless destroyed, keep up a slow movement toward the ostium and, with sufficient aeration and ventilation, the cavity will become clean through the recuperative and regenerative process of nature. With insufficient aeration and lack of drainage, we have decomposition of the secretions and, finally, an erosion of the mucosa and the involvement of the bone, with its corresponding osteitis and osteomyelitis. This is more prone to take place in the maxillary sinus than in the other sinuses because in this sinus and the sphenoid the ostium is placed high and, if there is a large overhanging swollen middle turbinate, there is no possibility of escape of the secretions.

Infections of dental origin are not all due to communications of tooth roots with the antral floor. Frequently, this is only a slight factor. Involvement of the periosteum from irritation and the production of an underlying osteitis will frequently cause an infection and the extension of a thrombo-phlebitis to the anastomosing antral veins and will permit the extension of an infection through a perfectly sound bone. The apparent great increase of maxillary antrum disease has been more or less coincident with a greater attention paid to dental conditions. Radiographs of diseased upper teeth—and there are 10 possible in the upper jaw: 2 bicuspid and 3 molars, right and left, as well as a gingival margin to infect the antrum—have disclosed many unsuspected infections. Latent antral disease may be lighted up by extractions, and chronic low-grade infections that have been draining fairly comfortably through the middle meatus may become so accentuated that the drainage can not be carried off and we have a breaking down of the natural defensive processes. Improper diet, the lack of vitamins and calcium, can be

shown experimentally to have a great effect in the formation of sound or unsound teeth or bones, as the case may be. The campaigns of tooth brushing have not brought about the desired results in the absence of sound dietetic principles. To a lesser extent, the diet has an influence, especially on the teeth and maxilla, in later life. Misplaced teeth, which may be growing directly upward in the antrum, are occasionally found, and any carious processes involving these will occasionally cause a disturbance in the entire antral floor. The procedure of irrigating the antrum as a routine when there has been a dental extraction with perforation, does not appear to be a good one. Thorough mopping and drying and the application of mild antiseptics and the closure of the wound, with a small drain permitting the formation of a blood clot, is much preferable. If necessary, a subtorbinal nasal antral wall resection to allow drainage may be performed. There is a tendency to the formation of a permanent fistula when packing is inserted from the mouth, or if persistent irrigations are kept up. It is clearly evident, from a mechanical point of view, that the tremendous pressure exerted in chewing will inevitably force food particles into such a fistulous area and keep up a continuous infection. In preventing the formation of such permanent fistulæ, it is necessary to secure the aid of our dental confreres in making a sort of temporary saddle plate which can be used to prevent the forcing of mouth material into the antrum, and yet permit secretions to escape.

The influence of trauma in the cases of dental origin can not be overlooked. Lyons found that penetration of the antral floor occurs firstly, as a result of the rocking motion of extraction, which tears into the antrum at the point immediately above and in contact with the root; and secondly, as the result of the failure to secure all of the root, with subsequent displacement of the root tip on attempting its removal. He gives the average duration of infections and fistulæ in his series as 349 days. Undue removal of the alveolar processes beneath the floor should be avoided. The reverse form of infection may be found when involvement of the teeth and tooth roots, through the production of an osteitis of the antral floor occurs with subsequent tooth destruction, production of apical abscesses, and the reinfection en masse of the antrum. Such a condition may be mistaken for a primary dental infection when, in fact, the dental destruction was secondary to the loss of vitality from antral infection.

The problem of malignant neoplasms, carcinoma and sarcoma, has as yet to be solved satisfactorily. Malignancies offer an interesting problem in the early stages in diagnosis. They are frequently of dental origin, arising around the tooth roots, and their primary

symptoms are usually dental. Scudder found that the most painstaking surgery rarely succeeds and the cure of cases with authenticated laboratory diagnosis is extremely rare. Bloodgood stated that in 30 years his records showed one solitary case of proved carcinoma of the antrum cured by excision of the upper jaw. Among the nonmalignant tumors we find the fibromata and the myxomata; the fibro-myxomata, which verge on polypi; the true mucous polypi; dentigerous cysts and the cysts resulting from apical abscesses; the osteomata and the odontomata; and the misplaced or supernumerary teeth. Radiographs have shown the presence of many of these nonmalignant conditions which otherwise would have passed unnoticed.

Foreign bodies embrace those introduced through the nose as well as those introduced by violence through the mouth. It is not unusual for children in play to introduce foreign bodies into the nose which may be forgotten and, by ulceration, reach the antrum and there be retained, sometimes for many years. Parts of fillings, portions of dental instruments, fragments and whole teeth are among the foreign bodies that reach the antrum during unsuccessful dental procedures.

Bacterial agents embrace all types of organisms found in the mouth or nose as well as those reaching the antrum from apical abscesses, or by migration through the tissue, whether through the lymph channels or arterio-venous system. An acute infection of dental origin is frequently characterized by the fearful odor of the pus. Anaerobes are often present in the cases arising from the mouth and are explained by Price as being aerobes which, through their inability of adjustment, have become facultative anaerobes. In this connection the bacteriology of dental apical abscesses is of interest, since organisms from these abscesses may be found later in antrum infections arising from such a source. Quoting Price, there are only about 2 per cent of staphylococci uncombined, while the most common are the various strains of streptococci, the fecalis constituting about 65.5 per cent, followed by the nonhemolytic type 3, and hemolytic type 1, each 3 per cent; the pyogenes, 4.5 per cent; the mitis, 7.5 per cent; the infrequens, 9 per cent; with the ignavious, salivarius, and the subacidus in scattering cases. The viridans is a strain of nonhemolytic streptococci, which gives a greenish discoloration on blood agar.

In a series of post-mortems on diphtheria cases, positive cultures have been reported on all examinations. This shows that any respiratory infection is sufficiently widespread to have its organisms in the antrum. Swimming infections are probably as much due to maceration of the epithelium, breaking its continuity and permit-

ting every present organism to attack the weakened tissues, as the presence of specific organisms in the water. Strongly chlorinated water for this reason is as prone to cause irritation followed by infection as water which has not been chemically sterilized.

**BUREAU OF MEDICINE AND SURGERY'S EXHIBIT, SESQUICENTENNIAL,
PHILADELPHIA, 1926**

By R. C. HOLCOMB, Captain, Medical Corps, United States Navy

In the Library of Congress there is a book containing some photographs of the Bureau of Medicine and Surgery's exhibit at the Centennial Exposition in 1876. The exhibit antedates the modern steel ship, and the array of closed stools, surgical instruments, and wooden models of wooden ships will all show a great contrast to the progress made in the last 50 years, which was illustrated to some extent in the Sesquicentennial.

The Sesquicentennial grounds were located adjacent to the navy yard at Philadelphia, so that there were a naval hospital, a naval dispensary, ships with their medical departments, and, for a large part of the time, a hospital ship, actually in evidence. Within the Sesquicentennial grounds proper there was a Marine camp, Camp Samuel Nicholas, where the medical department had a small tent hospital with a complete medical department outfit on exhibition, which was in charge of Lieut. J. B. O'Neill, Medical Corps, United States Navy.

One of the buildings in the navy yard, known as building No. 29, and near the entrance, was selected as a Navy Museum, in which was housed the historical exhibit. In this building the Bureau of Medicine and Surgery had allotted it a space of about 718 square feet, exclusive of isles, where the medical exhibit was placed. This exhibit undertook to show, in cases, certain surgical instruments of historical value, and another display case contained old books and journals of historical interest to the Medical Corps. By means of several displayers an attempt was made to show by photographs the successive training of personnel at our various schools, such as the Naval Medical School, Dental School, and Hospital Corps schools. By this same means were illustrated the training schools at foreign possessions conducted by representatives of the Navy Nurse Corps for the training of native nurses. In addition to these displayers there were graphs illustrating the incidence and conquest of disease; an electrically operated daylight projection apparatus; the equipment of a complete dental outfit, as furnished the modern ship; a built-in, exact size, replica of the operating room

and sterilizing room of the U. S. S. *Lexington*; and, in contrast to this latter, the cockpit of the U. S. S. *Constitution*.

At Camp Samuel Nicholas, within the Sesquicentennial grounds, there were six exhibition tents as follows: First, Hospital Corps quarters; second, laboratory and office equipment; third, medical equipment; fourth, surgical equipment; and fifth and sixth, ward tents.

A large number of people visited the exhibition both at the camp and at the museum building. On one day over 3,400 people entered the museum building. One of the medical department exhibits of great interest to all visitors was the contrast between the cockpit of the old *Constitution* and the sick bay of the modern *Lexington*.

In the securing of material for the cockpit of the *Constitution*, which excited a great deal of interest, I am indebted to many sources. The idea had its origin with Capt. Harold W. Smith, Medical Corps, United States Navy, of the Bureau of Medicine and Surgery, but great assistance was also given by the commandants at Boston and at Newport stations by the taking of pictures of the *Constitution* and *Constellation* and in making plans of them in order to make the replica of the former as exact as possible. In attempting to find material in the way of surgical instruments, hardware, fixtures, such as lamps, etc., we found a great paucity, and inquiry at many yards made it evident that valuable samples of historical interest found no room in our busy yards. It seemed to bring out the need for a museum to preserve things of interest and particularly articles which may have been used in any of the wars or expeditions since the Revolutionary War.

To assist in caring for and explaining the exhibit, the bureau detailed three corpsmen and one nurse who were fully indoctrinated with the literature of the old cockpits and other matters of interest. For a description of the cockpit in battle one is referred to the article by Commander W. L. Mann, volume 24, page 186, UNITED STATES NAVAL MEDICAL BULLETIN, and an article by Admiral E. R. Stitt, Medical Corps, United States Navy, which appeared in the October, 1926, issue of the Journal of the American Institute of Homeopathy. The views attached will give some idea of the character of the *Lexington* and of the cockpit exhibit.

The first ship of the Navy upon which I went to sea was a sailing ship, the U. S. S. *Monongahela*. She belonged to that period of wooden ships constructed about the time of the Civil War and which could be navigated either by steam or by sail power. It so chanced that she was caught in a tidal wave off the island of Santa Cruz and carried inland on the beach, so, in order to float her again, her engine had to be taken out. She had no cockpit. The cockpit

is an institution belonging to the days of our early Navy and before we gave space for steam engines. There is a cockpit on the *Constellation* and also on the *Constitution*, two of our earliest ships, both of which are still afloat. Here the surgeon had his station in battle. The cockpit space on both of these ships is very low, the height being barely 5 feet 6 inches in the clear, but into this space projected from overhead heavy deck beams, extending down in some instances 18 inches below the ceiling line, giving very little head room—actually only about 4 feet. The cockpit was below the water line and was selected for the surgeon's station in order to give protection against the enemy's shot. Being below the water line, it had no natural illumination from ports, and even that light coming through the hatches passed through several decks and was dim and negligible by the time it reached the cockpit. In time of battle this space was proverbially hot and ill-ventilated, and Cutbush, in his directions on preparation for battle, made the rule that no lights should be lit to increase its heat until after the wounded began to arrive. The medical officer and his assistants therefore sat in darkness, listening to the shots and shouts and other racket about them with little knowledge of how the ship was faring in the fight. This was not the space where the sick were kept in ordinary cruising. In ordinary cruising one of the bays of the ship was set apart for caring for the sick, a bay being a space including a gun port and the space between it and the next port. This bay for the sick was known as the sick bay, a term still used to denote the medical department. The cockpit of our American ships was used as the junior officers' mess room.

In the case of the *Constitution* there were four staterooms and six storerooms opening into it. These staterooms got very little ventilation except what could be delivered into the cockpit through a canvas windsail. The door to the stateroom and the paneling on either side of the door, in both the *Constitution* and *Constellation*, consisted of an open panel, balaster work about 16 inches square, which left the occupant of the room always in view unless he covered this opening with a curtain of some kind. Below the cockpit in both of these ships was the magazine, and it may therefore be seen that the access for the sick was also the access for handling the ammunition, which could not have improved conditions. The actual floor area was very small, being approximately 16 by 18 feet, the central part of it being fully taken up with a hatch. Water was scarce, and what there was of it was not particularly clean, but, on the other hand, frequently polluted. Cutbush in his preparation for battle provided that buckets and tubs of sand should be taken below in order to receive the blood and amputated members. Great faith was had in vinegar as an antiseptic, and we see this article in the lists

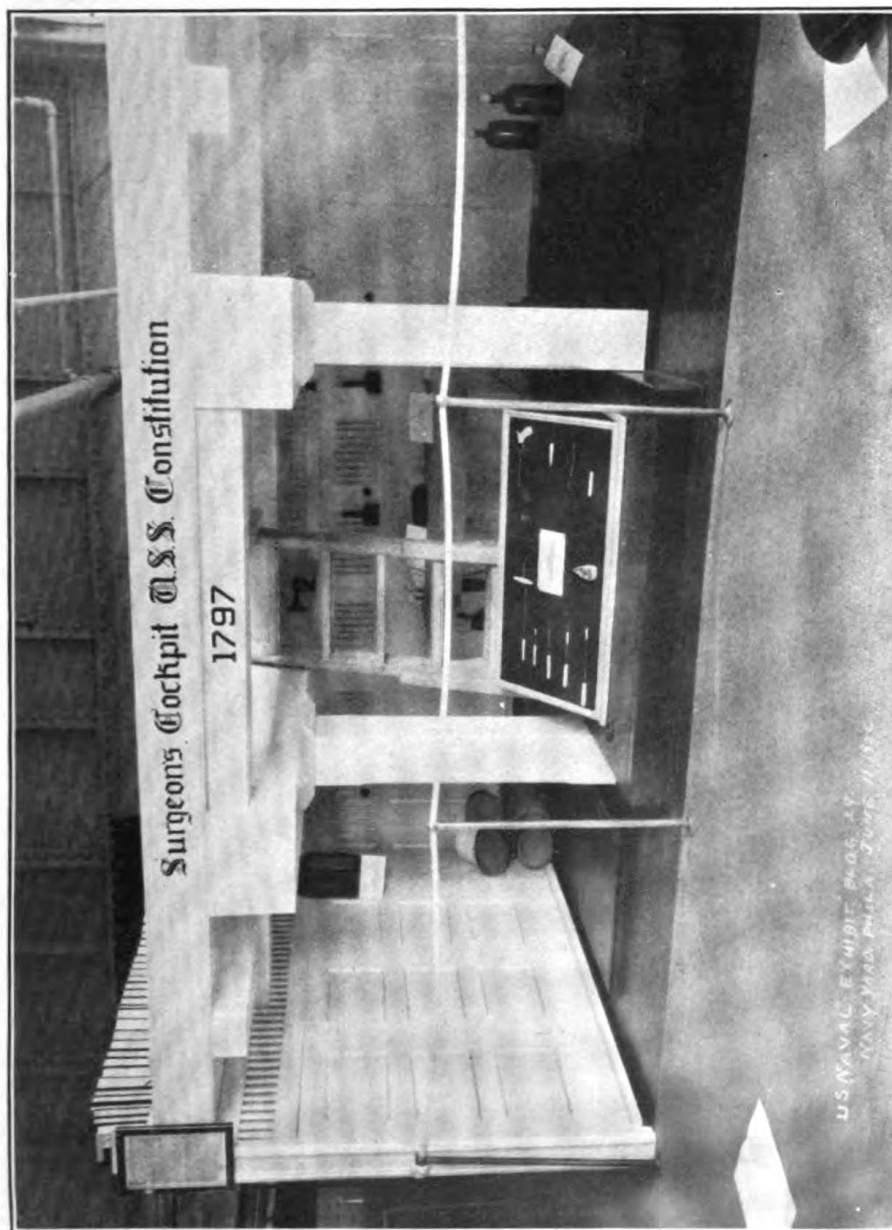


FIG. 1.—COCKPIT OF THE CONSTITUTION AS REPRODUCED AT THE SESQUICENTENNIAL

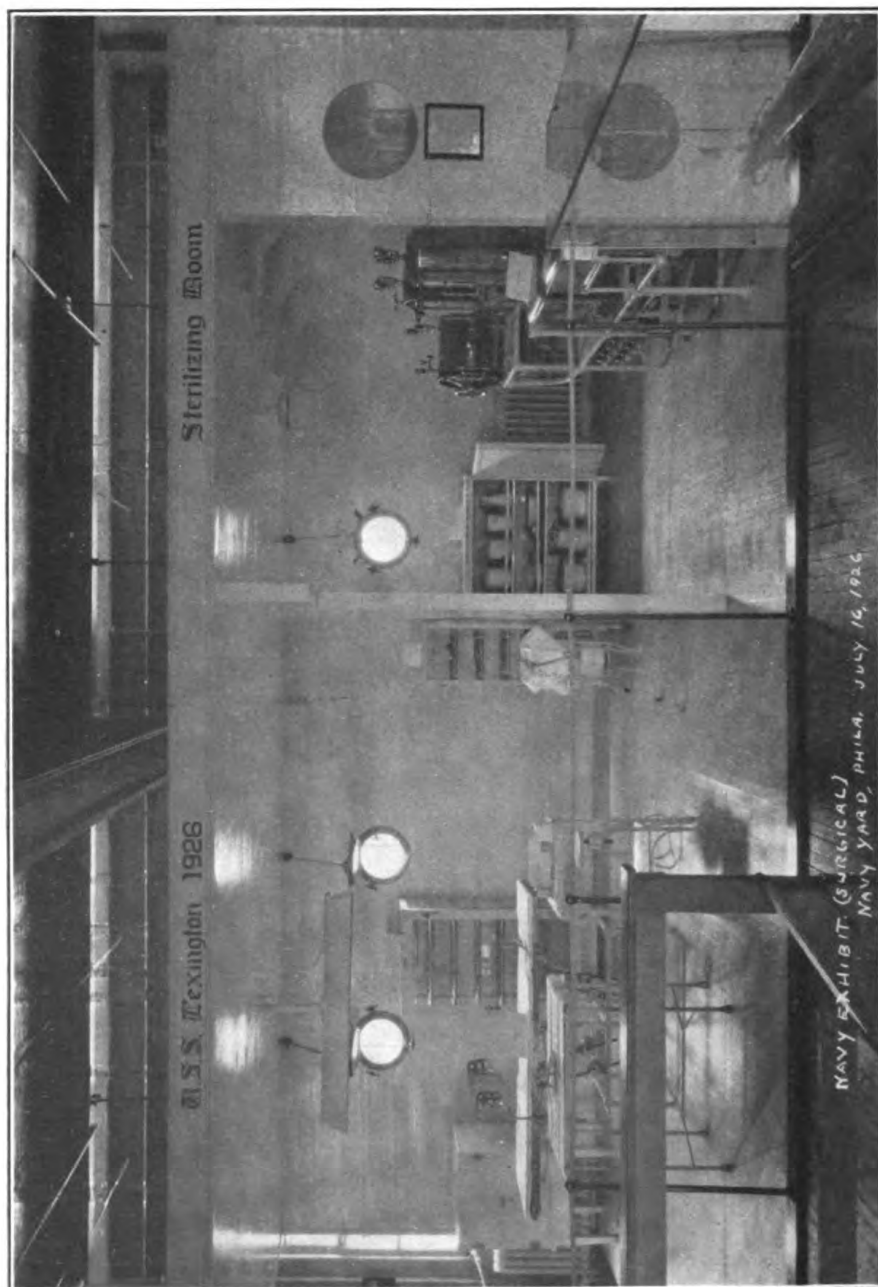


FIG. 2.—OPERATING SUITE OF THE LEXINGTON AS REPRODUCED AT THE SESQUICENTENNIAL

of both British and American medical supplies of that time. It was even sometimes evaporated with an idea of destroying infection by its pungent odor. For the deadening of pain, rum and laudanum were the handiest ingredients. In addition to these it was necessary to use some restraint, which was accomplished by use of straps with which a patient was strapped securely to the table, as one might secure an animal in a laboratory.

There are several books in the Naval Medical School which are contemporaneous with these days and which will give us some idea as to what the medical department carried in the way of instruments and supplies. In constructing our model of the cockpit of the *Constitution* various plans were considered, namely, that of constructing it with compo-board; that of making it of canvas, painting in the staterooms, etc.; but, after studying the actual plans and photographs and character of paneling, it was seen that the three sides could easily be constructed by using ships' doors both for paneling and for doors, and an effort was made to secure a type which with some slight alterations might meet the circumstances. There were many discouragements in connection with obtaining these doors, one of them being that only two days before we began our search something over 200 ships' doors which had been in the building to be used for exhibit purposes had all been taken to the dump and burned. We managed finally to secure from a building that was being torn down a type of door which corresponded with the paneling and which, by a few alterations, could be made nearly to duplicate the paneling in the cockpit. These alterations were made by the carpenters at the naval hospital, League Island, and, with the aid of the ship carpenters of the U. S. S. *Mercy* and detail plans of the cockpit of the *Constitution* prepared at the Boston yard, the cockpit of the exhibit was produced. In making the plans of the *Lexington* much assistance was obtained from the superintendent of construction at the Bethlehem Ship Building Co. at Quincy, Mass. Only three rooms were selected for duplication, these being the operating room, the sterilizing room, and the dental office. In addition to these rooms, the medical department of the *Lexington* consisted of—

- (1) A large 30-bed hospital ward.
- (2) With adjacent toilets and bath and wash rooms.
- (3) A diet kitchen.
- (4) A quiet room.
- (5) A small isolation ward for contagious diseases.
- (6) With its own toilets.
- (7) A dressing room.
- (8) A surgeon's office and examining room.

- (9) A record office.
- (10) A dispensary.
- (11) A prophylactic room.
- (12) A dark room for eye, ear, nose, throat, and other examinations,
- (13) And a dental office with two dental outfits similar to that exhibited here.

All of the above rooms are in one large suite, and in addition to these there is, below the water line, a battle dressing station fitted with water sterilizers and other operating equipment for use during battle, and in the depths of the ship are located spacious medical storerooms for the carrying of an extended supply of medicines and surgical dressings, instruments, and appliances.

The plan of this department was shown schematically on one of the bulkheads.

In equipping the cockpit of the *Constitution* three types of lard-oil lamps were secured, two of them being the old brass box lights with the reflector having three glass panels, one on the front and one on either side. Another type was the brass gimbal light, which swung in gimbals at the rearing and pitching of the ship. A third type of light that we secured was a little brass portable hand light used in these days. These lamps were discovered amongst old and miscellaneous supplies about to be offered for sale for old brass. There was also displayed the old water breaker used for a long time for carrying water through the boat and about the deck. There were demijohns of grog and large bottles of vinegar and laudanum in evidence, also straps for securing the patient to the mess table, which was itself firmly and securely lashed to the deck. About the cockpit were also tubs containing sand for the reception of blood or amputated members, such as have been described by Cutbush. There were also in evidence bandages, oakum, and lint, such as were used for surgical dressings at this time. We found some difficulty in securing the instruments of this period, but after finding some old instruments at the supply depot with scored ivory handles, and comparing them with illustrations in books on naval surgery written in 1810, we made our selection, which consisted of catlin knives; scalpels, trephines, with the trephine brush, such as was used in those days; tourniquets of a type illustrated in these books; and old pinch artery forceps long antedating the modern teeth and clamp type. In contrast to this equipment was the modern sterilizing unit, consisting of dressings, instruments, utensil and water sterilizers, a large cabinet of surgical instruments to handle almost any situation of modern surgery.

Edward Cutbush (1772-1843), the senior surgeon of the Navy at the time of the commissioning of the *Constitution* and the *Constellation*, and one time medical officer of the latter ship, as well as of the *United States* and the *Constitution*, has left us a description of the preparation of the cockpit of the old sailing ship for battle. It is so complete, in the matter of personnel, material, and environment, that it is quoted in full:

When the drums beat to quarters on the approach of a strange sail, the surgeon should take his station in the cockpit with his mates and loblolly boy. The purser and chaplain are generally stationed there.

The table to receive the wounded, if there be much sea, should be lashed to the deck. As the cockpit is covered with gratings and tarpaulins, and, of course, very warm, it will be proper to postpone lighting all the candles or lamps until the engagement commences. I have often thought that fans might be advantageously attached to the beams, on both sides of the cockpit, and worked by a treadle to agitate the air; they would add much to the comfort of those who are obliged to remain below and would not be expensive. The loblolly boy should have plenty of water procured, that it may not be necessary to send for it during the hurry of business. No ostentatious display of instruments should be made; all the necessary apparatus may be conveniently arranged in a tray on the top of the medicine chest and covered with a piece of green baize; or, if the medicine chest have a double lid, the instruments and dressings may be conveniently arranged therein, viz, pocket dressing instruments, amputating, trepanning and dissecting cases, spare tenaculums, armed needles, tourniquets, ligatures, bandages, among which should be plenty of single and double headed flannel and muslin rollers, crucial bandages, compresses of linen, lint, old linen, adhesive plaster spread on leather, retractors, sponges, pledgets of carded tow spread with simple cerate, thread, tape, pins, and splints.

A small match tub with sand in it should be procured, to receive the blood during any operation, to prevent the deck of the cockpit from being blooded. There should be plenty of vinegar at hand and water to drink. To prevent confusion, each person should be instructed in the duty he is to perform. Depend not on styptics in arterial hemorrhage. In consequence of the extreme heat of the cockpit, it will be necessary to take up a number of small ramifications of arteries that will not contract; the ligature is the best and most certain styptic.

The wounded may be removed to the gun room or berth deck, provided it will not interfere with those who are passing cartridges to the main hatchway.

Men who are slightly wounded should not be permitted to remain below, but should be sent to their quarters after being dressed, unless it be necessary to detain some of them to attend on those who are dangerously wounded. They should be frequently visited by the assistants, to see that there is no hemorrhage of consequence from their wounds; they should be instructed to tighten the tourniquet, should a hemorrhage come on.

If the vessel of war be small and without a cockpit, a place should be cleared for the accommodation of the surgeon and his patients; a chest must answer for his table to receive the wounded; if she be very small, I have no other advice to give than that the surgeon, although painful his situation, must manage as well as circumstances will permit.

The exhibit of the Bureau of Medicine and Surgery was awarded a medal of honor by the authorities of the Sesquicentennial Exposition.

MALARIA IN HAITI¹

By C. S. BUTLER, Captain, Medical Corps, and E. PETERSON, Lieutenant, Medical Corps,
United States Navy

Like most tropical countries, Haiti has suffered terrifically from malaria in the past and there are still considerable areas of the Republic the rich soil of which is rendered almost valueless by reason of this disease.

In the early settlement of the Antilles malaria and yellow fever punished the colonists severely. It is not possible to say whether malaria was found in the New World or whether the colonists brought the parasites with them and found competent vectors in the different countries colonized.

The fact that in Haiti the only efficient mosquito host of malaria is *Anopheles albimanus*, a species not found in Europe, might be taken to indicate that the colonists brought their parasites with them and found the vector on the ground. Clinical evidence makes it practically certain that all three types of human malaria existed in Europe before the discovery of America. It is unlikely that the Old World and the New World have developed independently three identical species of a single genus of Protozoa. *Albimanus* is an efficient transmitter of all three species of human plasmodia.

But whether human malaria was indigenous to Haiti or was brought from Europe is immaterial. We do know that the combination of malaria and yellow fever rendered many of the efforts at colonization futile. These diseases were often confused as regards diagnosis and generally operated together during the rainy season, at any rate as far as the nonimmune Europeans were concerned.

The accompanying photograph (A) of the ruins of the approaches to the French colonial palace at Cape Haitian may symbolize what perhaps was the most complete if not the most picturesque defeat that Napoleon Bonaparte ever sustained. It was here that General Leclerc, brother-in-law of Napoleon, died on November 2, 1802. Less than one year previously Leclerc had landed in Haiti with a big army and a big fleet to back up this army. His instructions from the first consul were to subdue completely revolutionary St. Domingue and to reinslave the natives who had previously been given their freedom. In less than a year malaria and yellow fever had decimated the French Army. Leclerc himself was stricken with yellow fever on October 23 when just recovering from a malarial attack. He died eight days later.

These two diseases killed off the nonimmune French recruits about as fast as they could be sent over. So that in the end the French were obliged to abandon their principal colony, having been beaten rather by disease than by the natives. It was planned to

¹ From the Public Health Service of Haiti. Reprinted from the Journal of the American Institute of Homeopathy.

carry into effect a successful campaign of only three weeks. Instead the campaign lasted two years and ended in disaster (1).

A glance at the accompanying picture of a relief map of Haiti (B) will show what a completely crumpled mass of land it is. Recall that the area of the Republic is only 10,200 square miles. It is smaller than the State of Maryland. About one-fifth of this area consists of coastal plains and the flood plains of small rivers. There is one relatively large, well-watered plateau, the elevation of which is approximately 1,200 feet, called the central plain. For such a small country the coast line of the Republic of Haiti is enormous. One can not get more than 65 miles from the sea at any place in the Republic. The population of the mountainous interior is in constant communication with the coastal towns. This has its bearing upon the spread of malaria to inland communities situated at sufficiently low elevations to permit of the breeding of *A. albimanus*, which breeds up to elevations of 2,500 feet.

In the small area of the Republic there is a great variety of climate. One may find considerable tracts of desert where the rainfall is practically nil and on the other hand cool, elevated sections where the rainfall is excessive. The rainy season extends from May to October, inclusive, and there are two peaks to the curve, one usually in May and the other in October. The late summer and winter is the period of greatest malaria incidence. It will be seen from the charts that the curve of malaria incidence also has two peaks. These lag behind the rainfall peaks by about two months.

It has been shown by Dr. William A. Hoffman, of the Haiti survey of the International Health Board, that *Anopheles albimanus* breeds all over the Republic wherever collections of water may occur. It breeds all over the central plain and in the western and southern part of the plain of the Cul de Sac. The greatest elevation at which Hoffman found *albimanus* breeding was at La Vallée (about 2,500 feet). There is undoubtedly indigenous malaria at this place. We do not believe that indigenous malaria occurs much above this elevation anywhere in Haiti. Aside from this the several hundred miles of coastline and all the river valleys breed *albimanus* and show a greater or less incidence of malaria. All the way from Fort Liberté on the north to Anse-à-Pitres on the southeast, malaria occurs. The determining factor is the amount of rainfall. From Fort Liberté and Ouanaminthe, at the international boundary in the north, all the way west to Port de Paix there is abundant rainfall and a high incidence of malaria. From this last-mentioned town around the coastline of the northwest peninsula and back east to the town of Gonaïves there is a condition of semiaridity and the malaria incidence is low. From Gonaïves east to Port au Prince, while the rainfall is on the whole less than on the north coast, yet there are several rivers which

enter the gulf of Gonaives along this stretch, and there is considerable irrigation, but malaria is not such a factor in morbidity as is the case on the north coast from Fort Liberté to Bayeux. The coast from Port au Prince to Jeremie, which includes most of the north coast of the southern peninsula, is perhaps the most malarious part of Haiti. The rainfall over this entire coast is considerable, many streams come down from the mountains, and there is much irrigation in certain districts. There are several undrainable swamps along this stretch of coast. Southeast of Jeremie, at a mountain town called Plymouth, the greatest rainfall for any place in Haiti is recorded. This was an annual rate of 167 inches (2). As we go west from Jeremie around the west end of the southern peninsula there is a relatively high malaria rate, and as we go east from Tiburon to Les Cayes the amount of precipitation and the malaria incidence increase.

Cayes is the wettest city in the Republic (rainfall from 80 to 85 inches annually). The surrounding country is flat and there is much irrigation. The plain of Cayes (some 300 square miles) acts like a vast sponge and the whole area is intensely malarious. As we go east from Cayes to Jacmel there is a considerable amount of desert country which tells its own story as regards malaria. The district around Jacmel is well watered by streams and rivers and has a rather high malaria rate. East from Jacmel to Anse-a-Pitres, at the Dominican border, the amount of rainfall is small, but just north of this band of coastline, and only a few miles away, is the highest mountain ridge in Haiti (Morne La Selle). Several streams empty into the Caribbean along this stretch of coast. There are several marshes here also, caused by the ground water coming to the surface at several places. At the extreme east a good-sized river (R. Pedernales) flows into the sea. There is relatively much malaria along this coast. Some of the local names are rather suggestive as, for example, *Adieu au Monde* (good-by, world) and *Saltrou* (dirty hole).

The place of least rainfall in the Republic is Mole St. Nicolas, at the extreme end of the northwest peninsula. Here the annual precipitation is only 21.7 inches on an average and this quickly runs into the sea or sinks into the earth, never to reappear.

The greatest annual rainfall for any inland station for which recent records are available is Mirebalais, which is only about 350 feet above the sea. Here the average yearly rainfall is 106 inches. It may be stated that the rainfall in the mountain regions is about 50 per cent greater than in the plains adjacent to them.

In some of the larger cities marked progress is being made with regard to the elimination of malaria by means of mosquito control. As explained above, malaria is most commonly found along the coastline of Haiti and also on the various plateaus in the higher regions. There are many sections in Haiti where, for years to come, the only measure that can be applied against this disease will be the admin-

istration of quinine to those actually sick. Small towns and villages may be found built right in the middle of swampy areas, apparently the primeval homes of *Anopheles albimanus*.

A system of inspection of school children, commenced primarily as a check up on vaccination, was made to include examination for splenic enlargements. The importance of this work is evident when it is realized that there are some schools in the rural sections of Haiti that show from 50 to 80 per cent of malarial infection as determined by the splenic index. The following table is enlightening:

RECORD OF SPLENIC INDEX AMONGST SCHOOL CHILDREN

Place	Period ending—	Number examined	Number of enlarged spleens	Splenic index
<i>District of Port au Prince</i>				
Port au Prince (30 schools).....	July, 1925.....	5,414	132	2.4
Ganthier (2 schools).....	do.....	87	2	2.3
Thomazeau (2 schools).....	do.....	62	5	8.06
Manneville (2 schools).....	do.....	39	0	0
Dumay (2 schools).....	do.....	149	12	8.05
Croix des Missions (2 schools).....	do.....	97	5	5.15
Petion Ville (2 schools).....	do.....	341	3	.88
Carrefour (1 school).....	do.....	42	6	14.28
Leogane (2 schools).....	do.....	427	152	35.59
<i>District of Petit Goave</i>				
Petit Goave (4 schools).....	do.....	353	84	23.79
Anse a Veau (4 schools).....	do.....	283	169	59.41
<i>District of St. Marc</i>				
St. Marc (7 schools).....	do.....	1,039	154	14.82
Bocozelle (2 schools).....	do.....	49	21	22.85
Ferrier (1 school).....	do.....	11	5	45.45
<i>District of Jacmel</i>				
Bainet (1 school).....	do.....	13	1	7.69
Bas Gris Gris (1 school).....	do.....	28	3	10.71
Cotes de Fer (2 schools).....	do.....	76	16	21.05
St. Antoine (1 school).....	do.....	31	8	25.80
<i>District of Jeremie</i>				
Jeremie (1 school).....	do.....	313	73	23.32
<i>District of Les Cayes</i>				
St. Louis du Sud (1 school).....	do.....	19	19	100
<i>District of Petit Goave</i>				
Petit Goave (1 school).....	April, 1926.....	116	56	48.27
Anse a Veau (1 school).....	do.....	97	25	25.77
<i>District of St. Marc</i>				
St. Marc (2 schools).....	do.....	474	40	8.43
<i>District of Jacmel</i>				
Jacmel (6 schools).....	do.....	655	160	24.43
<i>District of Jeremie</i>				
Jeremie (3 schools).....	do.....	226	24	10.61
<i>District of Hinche</i>				
Hinche (3 schools).....	do.....	179	22	12.29
Maissade (3 schools).....	do.....	61	17	27.87
Mirebalais (5 schools).....	do.....	113	24	21.24

This record of splenic index amongst school children shows more exactly what was spoken of above, that the incidence of malaria follows the rain curve provided no control measures are in operation. The low rate in Port au Prince is due largely to the control measures in effect. At Ganthier the rainfall is small and there is practically no mosquito breeding. Leogane and Petit-Goave are situated near the coast with large areas of swampy tracts in the vicinity. Anse-a-Veau, with a spleen rate of 59.41, not only has a considerable rainfall but also has an undrainable swamp in its environs. St. Louis du Sud is located in a swamp and until quite recently bred *albimanus* in practically every street of the town.

Port au Prince.—The city of Port au Prince has a population of about 120,000 people. It is located at the foot of a series of ranges which form a big watershed for the city. During heavy rains the water is thrown down over the city, transforming the streets in the lower sections into small streams.

The biggest part of the city lends itself very well to natural drainage, as evidenced by the number of large ravines or gullies that run from the hillsides down to the shore. During the rains these ravines are transformed into regular rivers. In addition, these gullies are continually fed from springs on the hillsides and by waste water from near-lying properties, so that even during the dry season certain sections contain water constantly.

The subsoil water crops out in a number of springs along the shore line of the city proper and for miles on each side of town. In many sections regular swamps are formed which in some instances are utilized as rice paddies.

During the spring of 1924 one of the writers (E. P.) made an extensive anopheline survey of Port au Prince and vicinity and *Anopheles albimanus*, the malaria transmitter par excellence of the West Indies, was found to breed practically all over the city. The various springs and swampy tracts along the shore line were the worst offenders. One could go into any property along the shore and find small springs overgrown with weeds and teeming with anopheline larvæ. In a certain number of these springs there were present mosquito-destroying fish (*Poecilia sphenops* and *Gambusia dominicensis*), but the luxuriant aquatic vegetation caused fish and mosquito larvæ to live happily together. The large ravines running through the town and numerous gutters were also found to be prolific breeding places.

In the suburban section of the city large springs with numerous swampy areas are common as, for example, along the entire shore line between Port au Prince and Leogane on one side and at Cazeau, Bon Repos, and the intervening area on the other. The Cul-de-Sac Plains that are under sugar cultivation and properly irrigated did not show an excessive breeding.

The aim of the Public Health Service was to rid the town proper of anopheline breeding and to extend this work as far as economically possible along the shore line on each side in order to protect the city as much as possible.

The gullies and gutters in town proper were cleaned out and kept so in order to give the water free flow. The large ravine through the center of town presented a problem, indeed, on account of its

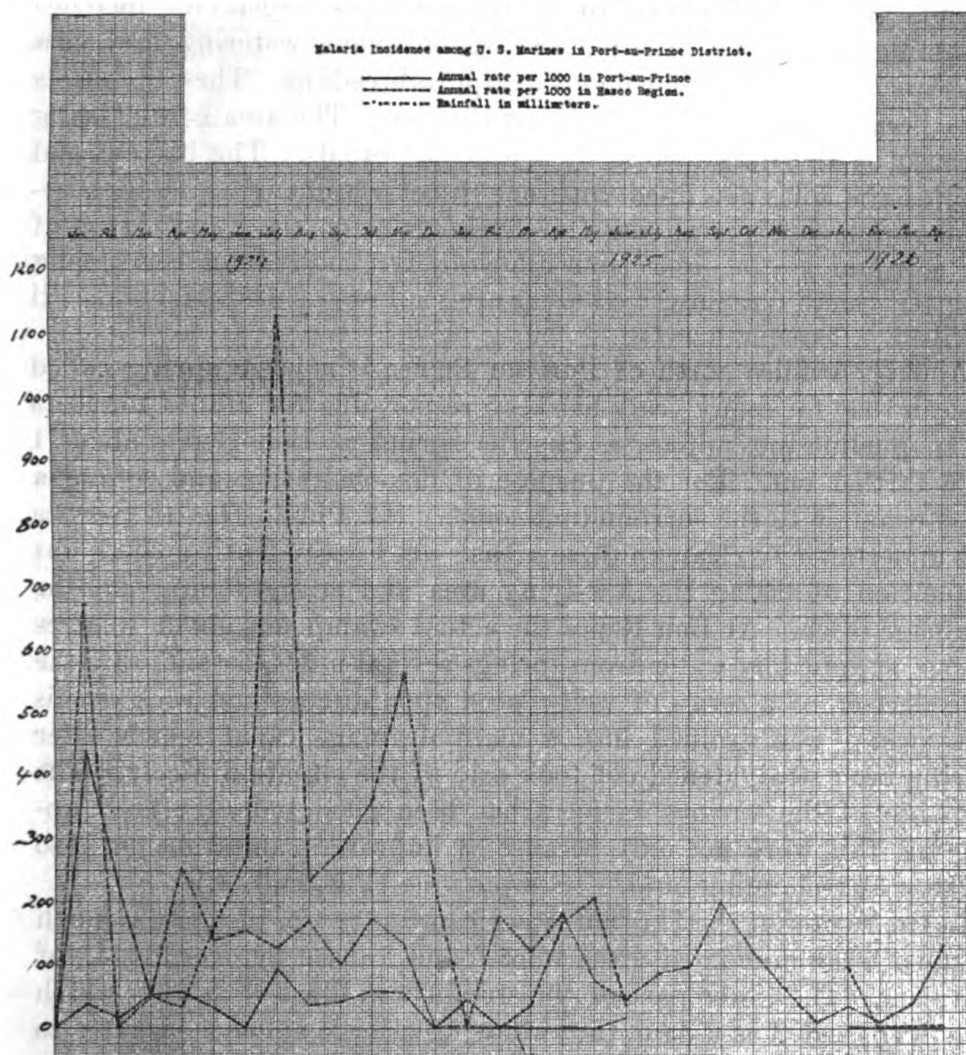


CHART I

large size and the numerous obstructions encountered. At present this ravine gives a continuous flow to the water at all times, due to weekly grading and cleaning.

The swampy sections along the shore line of the city proper have been filled in. (See picture C.) Cement drains have been built along the streets. Rock drains, a ditch filled with rocks and covered with dirt, have been made by the hundreds, with the result that, so far as mosquito breeding is concerned, this part of the city is in excellent

condition. At present the extensive swampy areas to the southeast of town are receiving particular attention. This section along the shore is quite extensive and constitutes a big swamp with fresh water in the upper part and tide water in the lower. It was entirely overgrown with bushes and other vegetation. The simple expedient of cutting down all vegetation caused a rapid drying up of large areas. In the upper part numerous rice paddies and potato patches were found. The local method of producing these vegetables includes damming up water for the purpose of continuous watering, and, as a consequence, we have continuous mosquito breeding. These practices have been stopped in the vicinity of the city. The area is now being drained by the introduction of a series of canals. The bottom and part of the sides are lined with one-third sections of three-inch cement pipes, thus permitting free drainage from the upper layer of the soil and at the same time allowing free flow from the spring proper. Small circumscribed areas are too low for drainage and will be filled. (See picture D.)

About 2.5 miles north of Port au Prince is a large spring called Cazeau that for many years has been responsible for untold numbers of anopheline mosquitoes, as has the spring at Bon Repos about 1 mile farther out. For the purpose of demonstration and giving a good example to the surrounding country the Public Health Service has undertaken to clear up these areas. At Cazeau Spring there was a question of filling the low-lying area and straightening out the drainage ditch. At Bon Repos the actual swamp was about 10 acres in size, supplied by water from springs several miles distant. By the introduction of a series of well-placed open ditches and rock drains the swamp was drained into a main drainage canal which after having been straightened out took care of the situation nicely. The response of the various farmers has been good indeed. They appreciate this work not only because of improved sanitation but also because of reclaiming land. (See pictures E, F, and G.)

In the region of the Haitian American Sugar Co. just to the north of town large inundated areas were found, caused by overflowing of a stream. The lower part of the stream was filled with dirt, which practically acted as a dam, thus allowing a large amount of water to be diverted and run along the sides of the railroad bed traversing this section. The old river bed was cleaned out and the water is now running freely. The banks of the stream are free from vegetation and the water is teeming with mosquito fish.

Effect of work accomplished.—It has been interesting indeed to watch the effect of this work upon the incidence of malaria in Port au Prince. The incidence of this disease among United States marines stationed in Port au Prince has been used as a criterion of the results obtained. From previous experience in Haiti it is known that the incidence of malaria is particularly high during the months

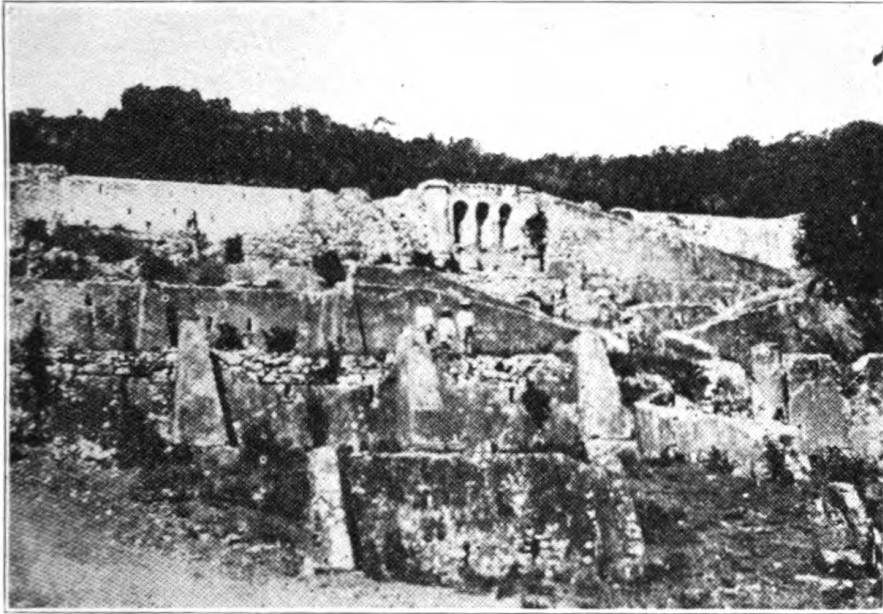


FIG. A.—RUINS OF THE APPROACHES TO THE FRENCH COLONIAL PALACE
AT CAPE HAITIAN

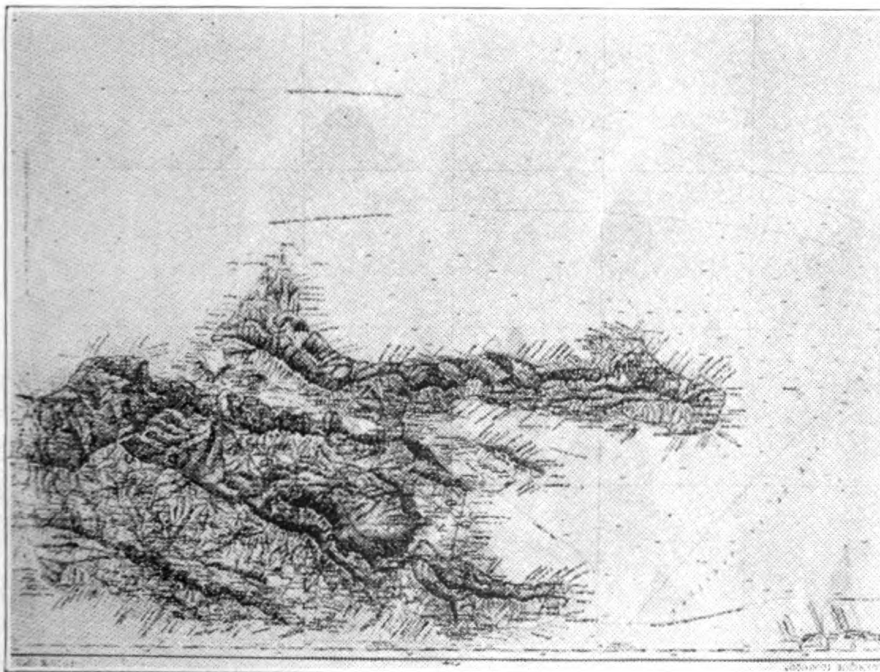


FIG. B.—RELIEF MAP OF HAITI

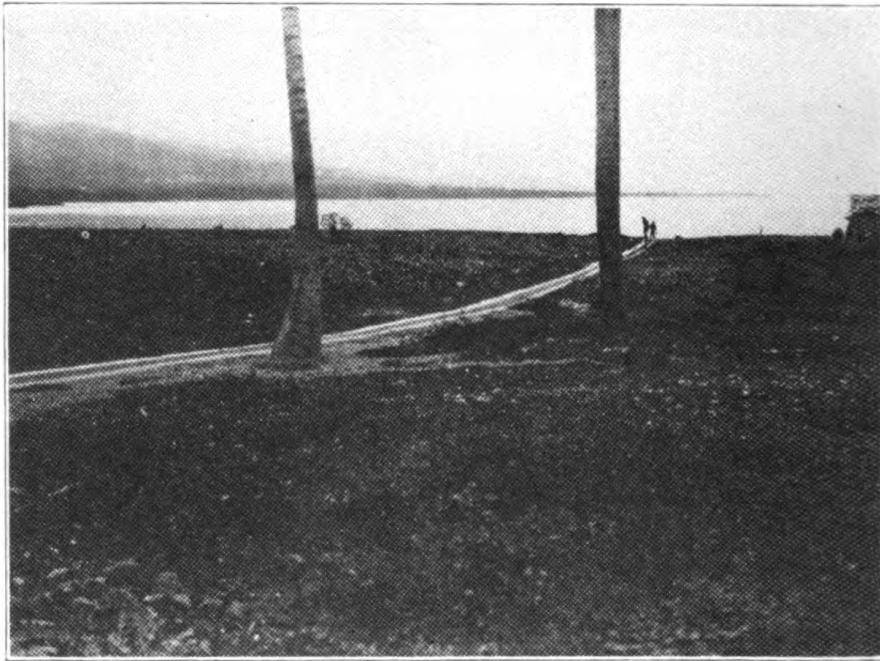


FIG. C.—SWAMPS FILLED WITH STREET REFUSE. SPRING OVERFLOW
DRAINED

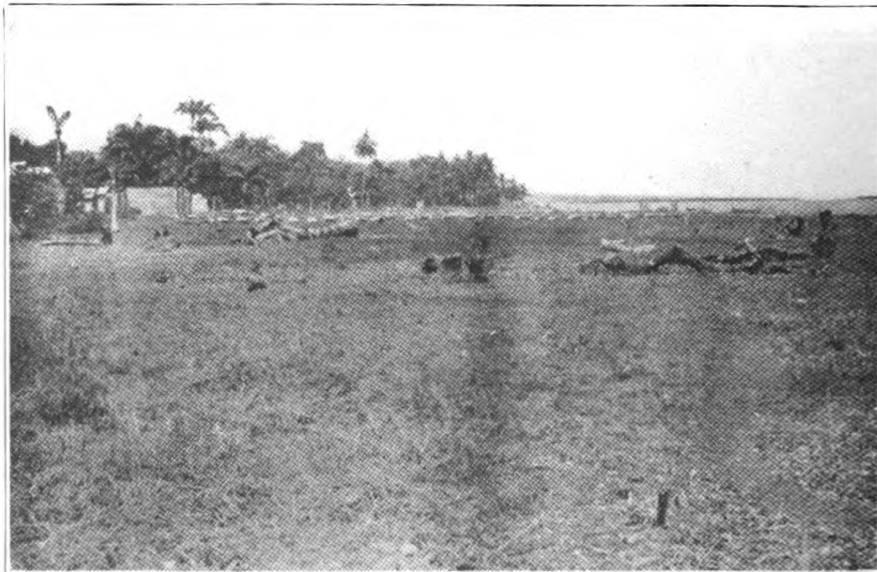


FIG. D.—DRAINING SWAMPS. NOTE ONE-THIRD SECTIONS OF CEMENT
PIPES IN BACKGROUND

24-2



FIG. E.—THE MAIN SPRING AT BON REPOS BEING CLEANED

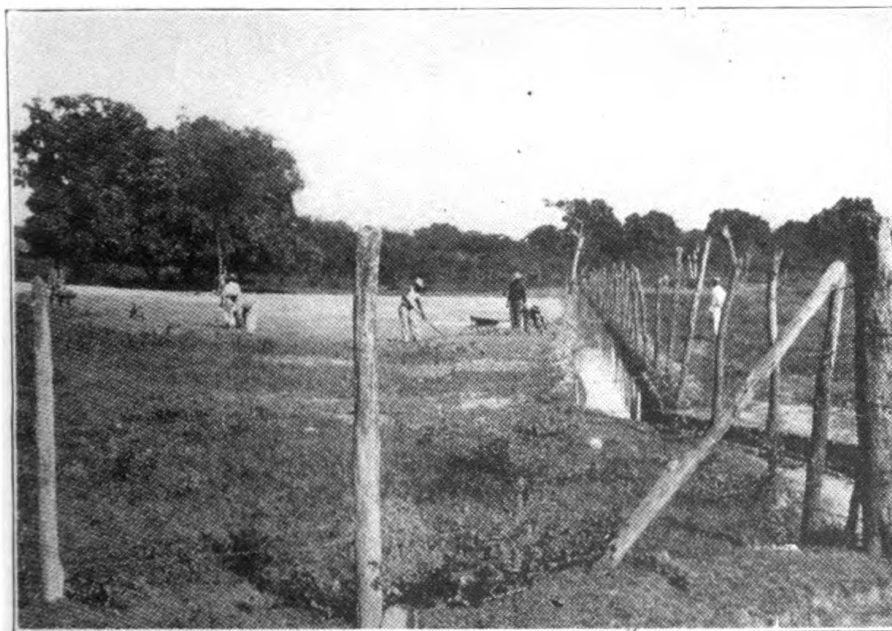


FIG. F.—THE MAIN DRAINAGE CANAL AT BON REPOS STRAIGHTENED OUT

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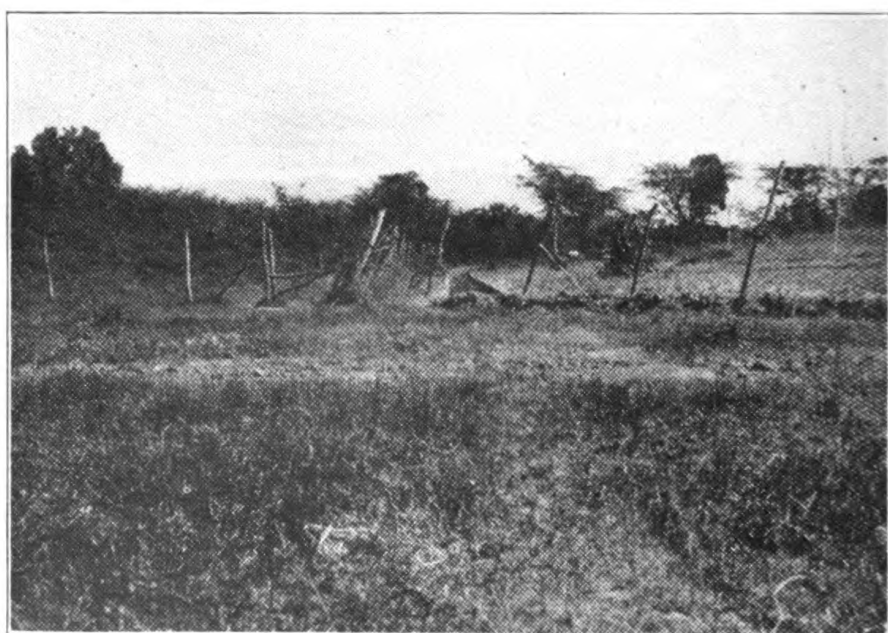


FIG G.—THE SWAMPS AT LOWER END (BON REPOS) DRAINED AND
284—4 FILLED

of November, December and January, and June and July. For the purpose of analysis the cases have been divided as to the probable source of infection. The three main groups are:

(1) City proper, including barracks, military police headquarters, field hospital, etc.

(2) Hasco region, including observation squadron, signal company, transport company, and rifle range.

(3) Camp General Russell (near Pont Beudet, 14 miles north of Port au Prince).

The accompanying tables showing the incidence of malaria among United States marines in the Port au Prince district are self-explanatory, and show the gradual reduction of cases up to the present time. The disease has practically ceased to be a problem for the city proper.

It will be noted that on these charts the incidence for malaria is not given for July–December, 1925.

During this period an undue number of so-called "malaria infections" was reported. On investigation it was found that proper methods were not used in the laboratory diagnosis. A control of the diagnosis was instituted whereby the incidence was reduced to zero in January, 1926, a month when the occurrence of malaria should be at its highest.

Duplicate slides of eight cases reported during December, 1925, were examined and all found negative.

Malaria incidence among United States marines in Port au Prince district

	Port au Prince			Hasco			Camp General Russell			Rain-fall (mm.)
	Com-ple-ment	Num-ber of cases	Annual rate per 1,000	Com-ple-ment	Num-ber of cases	Annual rate per 1,000	Com-ple-ment	Num-ber of cases	Annual rate per 1,000	
1924										
January.....	548	20	437.95	232	13	672.41	275	10	436.36	37.4
February.....	593	11	222.59	232	0	0	268	13	541.66	18.5
March.....	686	3	52.47	238	1	50.42	93	0	0	54.6
April.....	635	3	56.69	325	1	36.92	121	0	0	255.1
May.....	715	2	33.56	224	3	160.71	141	0	0	143.6
June.....	620	0	0	222	5	276.27	197	0	0	154.7
July.....	637	5	94.19	192	18	1,125.00	273	3	131.86	128.7
August.....	638	2	37.61	205	4	234.14	278	1	43.16	173.3
September.....	594	2	40.4	210	5	285.71	267	1	44.94	100.5
October.....	607	3	59.31	196	6	367.34	271	1	44.28	175.9
November.....	625	3	57.60	192	9	562.50	271	2	88.56	135.4
December.....	694	0	0	217	4	221.19	102	2	235.29	0.5
1925										
January.....	230	2	45.28	264	0	0	271	3	130.84	1.8
February.....	563	0	0	290	0	0	272	2	88.56	177.8
March.....	614	0	0	321	1	37.28	191	3	188.48	121.8
April.....	604	0	0	287	4	167.24	177	0	0	179.6
May.....	639	0	0	291	5	206.18	166	0	0	75.3
June.....	653	1	18.37	310	1	38.71	74	2	324.32	44.4
July.....	679			311			Abandoned.....			86.8
August.....	652			273			do.....			99
September.....	572			286			do.....			202.5
October.....	621			280			do.....			123.9
November.....	602			294			do.....			64.7
December.....	621			251			do.....			11.2

Malaria incidence among United States marines in Port au Prince district—Con.

	Port au Prince			Hasco			Rain-fall (mm.)
	Com-ple-ment	Num-ber of cases	Annual rate per 1,000	Com-ple-ment	Num-ber of cases	Annual rate per 1,000	
1926							
January.....	619	0	0	247	2	97.17	34.5
February.....	626	0	0	250	0	0	5.6
March.....	659	0	0	271	0	0	41
April.....	610	0	0	286	0	0	133

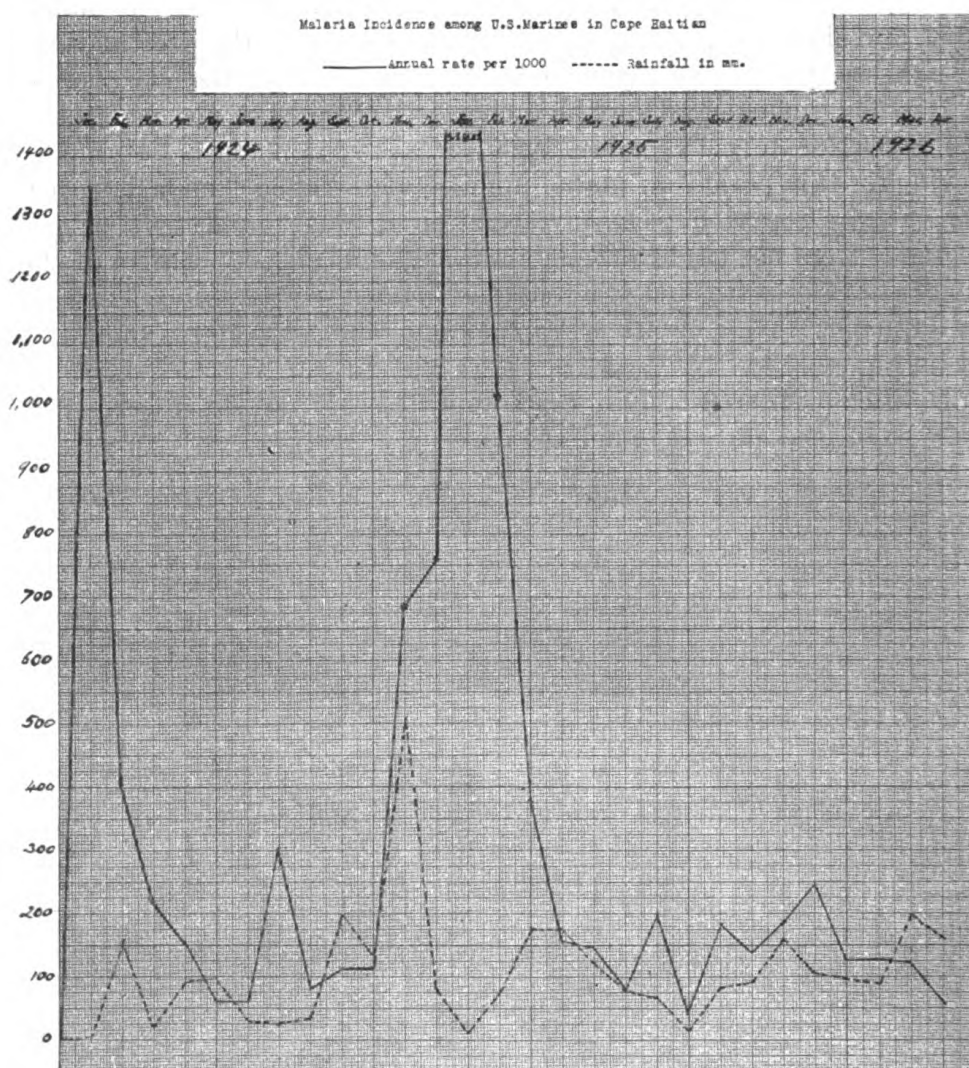


CHART II

Cape Haitien.—The malaria situation amongst the United States marines in Cape Haitien presents some very interesting figures. As seen from the charts, a severe epidemic started in November, 1924, with an annual rate per 1,000 of 684.08; reached its height in Janu-

ary, 1925, with an annual rate of 2,881.02 per 1,000; to fall to its normal level in May.

As seen in the chart, there was an unusual rainfall during September, October, and November, 1924. This resulted in the formation of large swampy areas practically all around the marine camp. No particular efforts were made to control the situation until January, 1925. The rains abated during December, January, and February, giving the Public Health Service a chance to initiate effective measures immediately.

An *Anopheles* survey in January revealed the presence of larvæ of *Anopheles albimanus* in the newly formed swampy regions, and even throughout the city in gutters and drains fed by fresh-water springs.

The marine camp is located toward the south end of town in close proximity to an extensive swamp extending along the shore of La Rivière du Haut du Cap. The anopheline breeding going on in this section undoubtedly is responsible for the "normal" incidence of malaria amongst the marines at Cape Haitien, the natives of the region supplying the parasites in abundance.

A systematic scheme of drainage and filling has now been commenced throughout the town and near-lying swamps.

Antimosquito work is also being carried on at various other places, notably Les Cayes, Jacmel, Petit Goave, St. Marc, Gonaives, Port de Paix, and Hinche.

The funds available for this purpose are not large, but they enable us to make a beginning. The results obtained show that the money spent is money well spent indeed, and before many years have passed it is hoped that every commercial port in Haiti will be free from the malarious scourge.

Incidence of malaria among United States marines in Cape Haitien

	Comple- ment	Number of cases	Annual rate per 1,000	Rainfall (mm.)
1924				
January.....	311	35	1,350.48	3.7
February.....	356	12	404.49	155.5
March.....	442	8	217.19	21.8
April.....	465	6	154.84	91.7
May.....	396	2	60.61	96.1
June.....	401	2	59.85	31.9
July.....	392	10	306.12	25
August.....	388	1	30.93	34.6
September.....	427	4	112.41	199.3
October.....	427	4	112.41	134.3
November.....	421	24	684.08	510.9
December.....	506	32	758.89	81.7

Incidence of malaria among United States marines in Cape Haitien—Continued

	Comple- ment	Number of cases	Annual rate per 1,000	Rainfall (mm.)
1925				
January.....	429	103	2,881.02	13
February.....	437	37	1,016.12	76.7
March.....	407	13	383.29	177.9
April.....	384	5	156.29	177.5
May.....	329	4	145.89	122.8
June.....	297	2	80.81	79
July.....	299	5	200.67	68.9
August.....	288	1	41.66	15
September.....	195	3	184.61	82.5
October.....	171	2	140.35	92
November.....	193	3	186.53	161.2
December.....	193	4	248.70	105
1926				
January.....	192	2	125.00	97.5
February.....	189	2	127.00	90
March.....	194	2	123.71	197.4
April.....	197	1	60.91	161.6

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- (1) T. Lathrop Stoddard: *The French Revolution in San Domingo*, Houghton Mifflin Co., Boston and New York, 1918.
- (2) Quoted by Woodring, Brown, and Burbank, in *Geology of the Republic of Haiti*, p. 50, from Moreau de St. Méry.

INSTITUTIONAL POLICIES AS APPLIED TO A YEAR'S DENTAL ACTIVITIES

By J. L. BROWN, Lieutenant Commander, Dental Corps, United States Navy

This report has for its object the stressing of a few facts, which, it is hoped, may lend some assistance in solving Dental Corps problems. The present size of the Dental Corps precludes the possibility of organizing its administrative and operative procedures along the institutional lines that should obtain for results commensurate with the importance of modern dentistry. This fact, however, should not be permitted to obscure the vision nor to lessen the effort of any naval dental officer to strive for those desirable attributes. He should ever be devising means and exerting whatever of genius and effort he may possess to furnish the naval service with the greatest volume of the best dental service possible under the existing laws, regulations, and administration.

It is constantly to be borne in mind and should be an item of indoctrination that naval dentistry is institutional dentistry. We are not practicing for monetary remuneration nor endeavoring to retain the continued patronage of the particular individual, but rather are we rendering service to an immense military institution whose personnel must be kept physically fit.

It is well to remember that the Government has promulgated certain regulations governing the dental requirements of men enter-

ing the service; that these regulations have of necessity been issued with the object in view of being equitable not only to the applicant but to the Government as well. With this in mind, attention is invited to the fact that the life of the recruit prior to enlistment, say for 17 to 30 years, is a vital time in his developmental period during which and over which the Government has had no control. Therefore, if an applicant for enlistment is accepted with certain disease conditions, yet measures up to the required standard, the institution which he has joined is more or less obligated to do its utmost to prevent those disease conditions being a source of danger in the present and in the future. Under the spotlight of modern medico-dental research, this constitutes a responsibility of first magnitude requiring institutional policies and methods in order that it may be met.

This offers the reason for the establishment of the policies, both general and professional, which governed the operative procedure and conduct of practice in the year's work herein reported.

It has been the writer's good fortune to have been responsible for the administration of the dental activities at four different recruit depots (two naval training stations and two Marine Corps recruit depots), and it is from these experiences that the fundamentals of the system here reported and the conclusions drawn therefrom have been developed.

When the Marine Corps recruit depot was removed from the navy yard at Mare Island to the Marine Corps Base at San Diego, Calif., it was at once recognized that we were provided with an additional task, as well as a responsibility requiring thought, labor, and the coordination of all departments. As in any medico-military task, all facts and available information were taken into consideration, the necessary matériel and personnel were provided, and very definite general and professional policies were established to govern this particular line of work.

The general policy was threefold in character, providing, first, for the coordinating of the dental section with that of other medical department activities. It was neither to be apart from nor exist separately from other medical activities. The whole of the medical department, including the dental activities, was placed in charge of a medical officer, who, in turn, was responsible to the base surgeon. The second item of the general policy was that of cooperation with the Marine Corps recruit depot activities. This fixed responsibility both upon the administrative heads of the recruit depot and upon the medical department, and it is only fair to state that it was due to this cooperation that our methods met with a high degree of success. The third phase of the general policy, and the one more directly affecting the strictly dental activities, constitutes the peak

of the task, requiring that all applicants be examined, dental abstracts opened, and all indicated dental treatment accomplished.

In order to accomplish a task governed by such a policy, it became necessary to establish a definite fixed professional policy. This, likewise, was multifold in character. Recognizing that the item of time is one of the greatest factors in the successful accomplishment of such a task, it was provided that no appointments should be made. The fact that the applicant had a diseased oral condition automatically admitted him to the "dental list" which was established and from which he was discharged in the same manner as patients are discharged from the "sick list." The second item of this policy embodied the recognition of the fact that one patient's conditions must not be considered more or less important than those of another and must be disposed of completely before initiating treatment for those of another. The third portion of this policy, and one which at first may appear rather radical, provides for the attempting of no root canal work other than in a few exceptional cases, and those limited largely to anterior teeth. To state reasons for this, other than the conservation of time, in view of the considerations previously offered, would necessitate a professional discussion not within the scope of this article and which the following explanation renders obviously unnecessary.

The governing factors of the method employed to carry out this general and professional policy developed as the end result of the previous year's evolutionary processes. The first year's work suffered greatly, due to the lack of dental personnel, acceleration in recruiting without a corresponding increase in dental officers, lack of sufficient matériel, and incomplete methods necessary for successfully following the policies established. It did, however, develop the methods necessary for accomplishing a very successful second year's work. The methods developed and employed are embodied in what follows.

Practically all clerical work was concentrated in the offices of the medical officer. The results of the dental examination were entered upon a dental abstract upon which the name, etc., had been typed by the clerical force of the medical officer's office. This office having received the papers of each recruit, it is obvious that the item of error could be eliminated better there than elsewhere. This office also typed the correct names upon the dental examining forms and sent them to the examining room, thus rendering routine a procedure necessary to the elimination of mistakes as well as relieving the dental office of a clerical operation, the data for which did not and should not pass through that office. The meaning of this simple procedure may be understood without further discussion. The hospital corpsman assistant entered the necessary data upon the abstract and the dental officer's signature completed his part of this clerical

requirement, following which the abstract was placed in the health record, where it remained. Subsequent dental operations were immediately recorded in accordance with prescribed instructions, after which only the dental officer's signature was required to complete the clerical procedure. The dental abstracts were never removed from the health records, and when it became necessary to make an entry on the "record of subsequent dental operations" and "dental abstract," the health record was furnished by the medical officer's office (no member of the dental staff ever entering the health record files), the entry was accomplished, and the health record was returned at once. At no time was it permitted to place a health record in a desk or cabinet drawer, a wire basket being provided on top of the desk in plain view for this purpose. Each day's work was entered on the abstract and duly signed and the health record returned to the medical officer's office. A special form, on which are entered the date, name, rate, company, and information as to caries, prophylaxis, useless teeth, missing teeth, restorations, and treatment given, was printed for use in recording the original dental examination and a supply kept on hand in the medical officer's office.

Following the opening of the dental abstract, these examination forms were filed in regular order, numbered from one forward, each month, the number corresponding to that in the "Examining Log." Each month's examination forms were wrapped, marked with the month and year, and filed in the office of the medical officer, thus affording a reference record long after the health record had left the station. This proved of value upon several occasions. The remainder of the clerical work, which was done in the dental office, was so simple and of such a character that the hospital corpsman assistant could quite easily accomplish it in addition to his other duties.

The dental examination was conducted in conjunction with the medical officer's examination in the room provided for that purpose, thus eliminating a great amount of traffic from the dental clinics. One dental officer and one hospital corpsman went to the examining room each morning and either before the medical examination or at a favorable opportunity, so as not to interfere with it, the dental officer proceeded with his examination. Standing with his back to the window, so that the light would fall into the open mouth of the person being examined, and using tongue depressors, he announced his findings while the assistant entered them with pencil upon the examination form. At this time any cases presenting carious teeth in need of oral prophylaxis or other dental treatment were recorded as "admitted" to the "dental list." The examination forms were then taken to the dental office for further use.

By way of explanation it can be stated that a dental examination of this character can be made quite accurate, but it must be admitted

that its accuracy is not equal to that made at the chair with proper instruments. However, the desired accuracy was accomplished when the patient presented himself for treatment, provided that inaccuracies became apparent then. Another advantage of this method of examination exists in the fact that the medical and dental officers are both present, and the coordinating of results can take place there and then, and usually a decision reached.

The establishing of a "dental list," in addition to the "sick list," afforded a method of accomplishing results that the writer has yet to see equaled. Every accepted applicant presenting defects was "admitted" to the "dental list" and there remained until disposed of. He could be disposed of only by having had *all* his dental treatment completed. The abbreviations used were: "C," (analogous to the "D" or "to duty well" of sick-list patients); "R," desertion (or analogous to the "Ran" of sick-list patients); "T," transferred from the recruit depot or from the station, or as a sick-list patient, to the naval hospital. "Dental-list" patients who were discharged under Marine Corps Order No. 1, invalided from the service, or who died, were all disposed of as "D" in order to concentrate such items under one disposition. This offers a fair range for dispositions covering most possibilities for cases other than "C" and leaving few possible leaks. A casual study of the monthly recapitulation for the year's work as given in Table 1, will show that of the total 746 admissions, 466 were disposed of as "C," and only 108 disposed of as other than "C" (completed), the sum of which, 574, compared with the total admissions, 746, shows a discrepancy of 172. This is accounted for by the fact that during the months of November and December there was not sufficient dental officer personnel on duty to accomplish the work. During November 92 admissions were not disposed of, and during December 80 admissions were not disposed of, the sum of which, 172, accounts for the inequality. A study of the 10 preceding months, however, will show a consistent balance between the number of admissions and dispositions.

Month	Number of carious teeth	Number of admissions	"C" dispositions	Dispositions other than "C"	Number of dental hours	Examination time (hours)	Total examinations
January.....	111	57	55	2	73	6½	83
February.....	21	14	13	1	16½	2½	29
March.....	70	30	25	5	44	4½	51
April.....	81	37	30	7	36½	6½	73
May.....	86	49	40	9	42½	6½	76
June.....	138	56	50	6	51½	8½	101
July.....	153	59	50	9	46½	7½	86
August.....	104	56	50	6	31	9	108
September.....	149	63	56	7	62½	9½	112
October.....	153	61	45	16	51	12½	150
November.....	297	138	27	19	44	15½	189
December.....	320	126	25	21	33½	12½	154
Total.....	1,683	746	466	108	533½	101	1,212

Time item, no dental duty	Days	Official office hours, 9 a. m. to 3 p. m. (1 hour off midday)
Sundays, no dental duty.....	52	Official office hours, day = $4\frac{1}{2}$.
Saturdays.....	52	$4\frac{1}{2} \times 140 = 630$ hours per annum.
Leave.....	30	$630 - 533 = 97$ hours.
Sickness.....	30	23 hours devoted to lectures.
Absent on duty.....	30	$97 - 23 = 74$ hours.
Holidays.....	5	101 hours for examinations (see above).
Half holidays.....	26	$101 - 74 = 27$ hours additional (out of hours).
Total.....	225	
Duty days.....	140	$(365 - 225 = 140.)$
Average complement dental officers.....	1.23	$(\text{Eliminate 50 days for November and December}) =$ $(2:365::X:225=1.23).$
Official average complement of dental officers.	2	

The method of constantly keeping the admissions before the dental operators, along with the necessary data concerning the patients, was embodied in what we termed an "Examination Log." This consisted of an ordinary "dental appointment" book so ruled and operated as to furnish the following data: Number, name, rate, date of examination, number of carious teeth, degree of oral prophylaxis required—which was indicated by one plus, two plus, or three plus; admissions, indicated by "A" in the proper column; disposition, indicated by "C," "R," "D," "T"; and "Dental hours," representing the actual number of operating hours or fraction thereof spent upon each patient. The patients were numbered from 1 forward to the end of the current month in the order of their arrival, this number corresponding to that entered upon the examination form. Dental conditions were recorded in terms of carious teeth, in addition to which a column was provided for indicating to what degree they were in need of oral prophylaxis, this being denoted by the signs — (negative) or +, ++, +++, meaning positive to the first, second, or third degree. The tooth was taken as the unit to indicate the presence of carious conditions thereof and not "cavities" or "number of cavities," as is commonly done. It is obvious from an institutional viewpoint that if a tooth presents carious conditions, any consideration of the number of carious places therein is a negligible item. The fact that the tooth is carious is the important information required, regardless of the number of carious spots or the extent to which caries has progressed. The usual means of disposing of these carious conditions of teeth is either by excavation and restoration of the tooth to a state of usefulness by means of a suitable restoring material, or by extraction. Any other consideration involves only the item of time and operative procedure and, therefore, for our purpose, "cavities" does not express an actual condition and can not be accepted as a truly diagnostic term indicative of an actual condition.

Another thought worthy of mention within the scope of this consideration is that of the numerical division of the various units—that is, the "carious teeth"—among the different individuals. From

our point of view, the number of carious teeth in one individual, be they greater or less than those of another, is of no consequence. What differences does it make so far as time and operative procedure are concerned whether we insert one restoration each for 10 men or restore 10 carious teeth for one man? None that is worthy of consideration so far as institutional effort is concerned, and the faster we, as naval dental surgeons, come to realize the truth of this, just in that proportion will our patients leave the dental clinics with all work completed. This is a discouraging task and there never seems to be an end in view. When a patient with 10, 15, or 20 carious teeth presents himself, the tendency to relieve the aching members and then "railroad" the patient is only human. Unless we constantly bear in mind that we are performing institutional dentistry, losing sight of the individual, "cavities," and even the number of carious teeth, so far as time and operative dentistry are concerned, there never can be progress, without which our mission can not even be made felt, to say nothing of fulfilled.

"Dental hours" constitutes the unit in reckoning the actual time involved in operative procedure for each "admission" to the "dental list." It will be recalled that the time item of "sick-list" patients is reckoned in terms of "sick days." It is signally evident that the time item of "dental-list" patients could not be justly reckoned in terms so great and yet, when one reflects upon the total time spent by a dental operator for a year, even though reckoned in terms of smaller units (dental hours) and the consequent loss of time of the patients to the Government, the figures are almost appalling. It will be observed in the table that 533 hours were devoted to operative dentistry and 101 hours to lectures, the sum of which, 634 hours, constitutes the total time consumed in examining and treating the 1,212 men. This would seem to indicate that 0.52 hour was the average per man, or approximately one-half hour per man. However, this is hardly a correct analysis, as 101 hours were devoted to dental examinations, which properly should be charged against the general physical examination and not to dental treatment. Nevertheless it is a charge against the time of the dental officer, and therefore a more equitable analysis would be 533 "dental hours" divided by the 466 dispositions, "C," or 1.12 "dental hours" per man, meaning that every man needing and receiving dental treatment constituted a loss to the Government of 1.12 hours and that the dental officers averaged 1.12 hours per man disposed of.

A consideration of this item illuminates a path in institutional dentistry worthy of some definite requirement for record. It most certainly affords the operator great satisfaction as well as offering a definite check upon the progress of the work. Regardless of the nature of the treatment, whether the most trivial or the most exten-

sive, the item of time enters into the operation, and time being the dental officer's "stock in trade," it should be dispensed with the best of judgment and a record of its expenditure made.

The next factor involved in the method employed, and one of vital importance, was the obtaining of the patients and continuing their operations until all of their conditions were disposed of. The success of this provision was due, in a great measure, to the cooperation of the Marine Corps administration. The men were permitted to leave the drill formation or whatever occupation they were engaged in when sent for, thus obviating the necessity of making appointments, which frequently result in disappointments both to patients and to operators. At no time were there any men waiting around the dental clinic for treatment and losing valuable hours of training period time. When a patient was desired he was sent for, and there was no question about his arrival, and that in short order. Most of the time the Marine Corps furnished us with a "casual" who acted as orderly for the purpose of going for and taking back the patients. This saved untold hours of time, both for the Marine Corps and for the operators, and this splendid cooperation can not be passed by without at least this recognition of such commendable assistance.

The treatment of a patient once being undertaken was carried through to completion regardless of the time involved or the number of sittings necessary, and, once completed, additional time was rarely lost because of subsequent dental treatment.

An important objective of this method of procedure is to accomplish this volume of work during the three weeks' detention period required for recruits. This has proved successful. This means that the major portion of the recruit's training period was uninterrupted by dental treatment, an item of value to the Marine Corps.

The ordinary "dental appointment" book or "day log," as we termed it, was maintained in accordance with existing instructions, with a few additions such as the recording of "dental hours" and indicating the completed, "C," cases. This furnished the total "dental hours" for each patient as well as the total "dental hours" per month or for any given period of time.

To the hospital corpsmen assistants, two of whom were graduates of the Naval Dental School, must be given credit for a great amount of valuable assistance and devotion and loyalty to their duties. These men learned to "speak our language" to a degree that was not only a credit to themselves but rendered their assistance invaluable. They performed the bulk of the clerical work in the dental clinics, supervised the general office routine, assisted during operations, and attended to the general cleaning and care of matériel.

They were trained as to the general and professional policies governing this activity as well as in "operative assistance," so that their usefulness contributed to the continuity of operations to the fullest extent. In short, they were real assistants, utilized as such and not merely "strikers."

At this point it would seem advisable to offer something in an explanatory way regarding the time item involved in the examinations and the opening of dental abstracts. It must be recalled that the dental examination, on the one hand, is really a part of the regular physical examination; but, on the other, it requires the services of a dental officer and his time and, consequently, must be reckoned accordingly. Following a long series of examinations, involving the opening of dental abstracts, we found that it averaged five minutes, at the very least, to examine the mouth and teeth and record the findings in the dental abstract. That figure is taken as the average in computing the time required for each examination and dental abstract of the 1,212 men examined. This represents a total of 101 hours devoted to this requirement alone. These constitute "dental hours," but do not represent time expended in actual operative dental treatment.

It is not desired to emphasize particularly the volume of work accomplished, but rather to demonstrate the possibilities of which such a system, based upon definite and fixed policies, is capable. In order that a better and fuller understanding may be apparent, it is necessary to offer additional explanation.

During the period of this report there were only two dental officers assigned to this duty, one of whom was held responsible for the dental activities of the entire station, which included other dental activities at the main dispensary. During the year one recruit depot dental officer was away from this duty for over a month with Marine Corps Expeditionary Forces, without a relief. There was also one officer away on a month's leave of absence, and one officer was on the sick list for 30 days. This, in turn, means that though "officially" there were two dental officers performing this duty, yet, in fact, the average complement of dental officers per annum was far short of two and while, according to the accompanying chart, 1.5 dental officers would seem to be indicated as the correct average complement, yet it must be noted that during the months of November and December there was very little accomplished, due to the shortage of dental officers, one being on the sick list and the other having been detached without relief, early in November. (A more accurate calculation based upon 50 days eliminated for November and December shows the annual average complement of dental officers to be 1.23.)

The office hours at this station were from 9 a. m. to 3 p. m., with one hour off for the midday meal. In addition to this, Wednesdays and Saturdays afforded half holidays, and Saturday mornings were devoted to a meager sick call and preparation for the commanding officer's inspections, while on Sundays, of course, there were no office hours. Add to this 5 other holidays during the year and, without computing the time required for parades, special conferences, special instructions, and other miscellaneous duty requirements, it will be found there were approximately 225 full days with no strictly dental duty. This subtracted from a 365-day year leaves but 140 clear duty days. Then consider the fact that the duty days were but $4\frac{1}{2}$ -hour days and a simple mathematical calculation renders only 630 duty hours per annum available. Of the 630 available hours, 533 hours were devoted to operative dentistry, leaving 97 hours for other official duty. The oral hygiene lectures delivered to each newly filled platoon, averaging approximately 40 men, required an average of 45 minutes per lecture, or 23 hours for the year, thus leaving but 74 hours for other official requirements, such as conferences, parades, special instruction, special liberties, and so forth. Compare this to the total number of "dental hours" indicated in the table, 533, and it will become plainly evident how this system resulted in the conservation of time and an increase in the volume of work done.

It will be noted that there is a difference of only 97 hours, and, recalling the 172 men admitted and not disposed of during November and December, it is seen that by granting the average allowance of dental hours of the 10 preceding months, had dental personnel been available, there would have been as even a balance. Therefore, for the purpose of this report the figures presented in the table are considered sufficiently accurate to demonstrate the efficiency and value of such a system governed by such general and professional policies. It should be explained also that 1,683 carious teeth were distributed among the 746 admissions; thus it would appear that each admission averaged 2.25 carious teeth. This, however, is an error, due to the fact that there was an appreciable percentage of admissions for causes other than carious teeth (oral prophylaxis, etc.). In the table a simple comparison of the figures in the totals for the year shows that 61.5 per cent of the men examined were admitted to the "dental list"; that of those admitted for treatment, 466, or 62.5 per cent, were disposed of as "C," with all work completed, and only 108, or 14.5 per cent, disposed of for other causes over which we had no control; that the total number of carious teeth, 1,683, represents exactly that number of different teeth infected with caries, regardless of carious places in one tooth, and *not* cavities.

All stages of caries of the teeth, from the most simple caries to those rendering the tooth useless, are included.

The 23 hours devoted to lectures to the newly filled platoons must be emphasized. It is to be remembered that these men come from all walks of life, having had very little, if any, previous instruction in the care of the mouth and teeth and, more important, the vital relation of the mouth and teeth to their present and future general health. With this as the theme of the lecture, endeavor was made to present it to the men in terms they could understand. They were instructed in the proper use of the toothbrush and dentifrices, the result to be gained therefrom, the reasons, and how neglect and improper use reaped their toll. They were urged to secure toothbrushes that fit the mouth and to clean the mouth before going to bed, all of which was supplemented by clinical demonstration and by presentation of the useful and useless toothbrush. The value of health and the relation of the mouth and teeth thereto, and not just teeth, were emphasized during most of the time allotted for these lectures. The results were an achievement of which I am justly proud, yet unable to show graphically herein. It can be stated, however, that I examined upon two different occasions the mouths and teeth of the regiment into which most of these men went following their recruit training, in addition to spending a month with the regiment on maneuvers. The results of this experience proved beyond the least doubt the value and far-reaching results of these lectures.

To the question of what conclusions may be offered as the result of such a year's work governed by the stated general and professional institutional policies and methods the following is offered:

That the recognition of some such general and professional governing policies are necessary to the successful fulfillment of institutional dentistry; that naval dentistry is institutional dentistry; that, operated as such, even with the material and personnel available, the success of its mission becomes more pronounced; that, if presented in this light, commanding officers and medical officers will invariably furnish the necessary cooperation; that dental officers are made to feel the responsibility that lies beyond dental personnel and material and acquire that military feeling of "duty done"; that the dental officer has ceased to be a "fifth wheel," but is a servant offering his "service to the service"; that, operating under such conditions, he is relieved of those disturbing elements embodied in broken appointments, waiting patients, and that ever-pressing question of "what to do"; that he is contributing his quota to the success of a definite and well thought out plan; that the item of time, while most vital, need not be a disturbing factor; that patients them-

selves feel they are receiving proper attention; that the graduate of such an institutional policy is more apt to abide by its teachings; that the present and future health of all concerned is benefited more as a result of institutional methods than otherwise; that collective organized effort accomplishes more even with limited means—verily, “In unity there is strength”; that dentistry is an integral part in medico-military problems and must be recognized as such; that obviously, the completed case, within the meaning of this article, requires very little, if any, future dental attention during the current enlistment; that, without system, the volume of work to be done is greater than the Dental Corps can master, the individual member of the personnel suffers, neglect prevails, and disease increases.

Assuming, and it is very logical to assume, that the figures herein possess some degree of accuracy, a calculation based upon them will reveal some interesting possibilities. According to these figures, 1.23 operators in one year “completed” 466 men. For the purpose of calculation let conservatism enter as a factor to the extent of allowing one operator to complete 450 men per annum. As a conservative estimate, there will be 25 dental officers on duty at the various naval training stations and Marine recruit depots who, if they follow such a system as outlined, could complete 11,250 men per annum. Estimating new enlistments each year for the service as between 15,000 and 18,000, and assuming that our 61 per cent is a fair average of admission rate, the virtue of such a system becomes plainly evident. It is not intended to convey the idea that all the completed cases will not need dental treatment again, but I believe that there is not a well-informed dental officer who will not agree that a properly instructed and completed patient will become a lesser risk, have better health, and require fewer readmissions than one who has not been thusly treated. In my own mind I am convinced that if such a policy were generally established a substantial reduction in “sick days” and hospitalization of patients could be depended upon within a reasonable time. We should also consider the benefit to, and improvement in operative dentistry among those units, both ashore and afloat, at other activities than training stations and recruit depots. The personnel assigned to battleships, destroyer forces, submarines, air forces, training ships, and even isolated stations would be greatly improved if they arrived on such duties with all dental requirements accomplished; there, the necessary readmissions for upkeep would not be so voluminous as to preclude the possibility of dental officers performing more constructive dentistry instead of expending so much time on what might be termed “emergency work” for the relief of suffering.

Especial attention should be given to those training station graduates who enter those specialties of the service, the air forces, submarines, destroyer forces, and Marine Corps activities, not only on account of the special duty of such but also because these units are too small to be self-supporting when it comes to medical and dental service. Following a cruise of long or short duration the dental officers on the tenders of submarines or destroyers are simply overwhelmed with demands for service; broken appointments are a cause of worry and a constant cause of a great loss of time. I believe that the concentration of dental activities at the naval training stations and the Marine recruit depots operated under institutional policies is a vital need. This conclusion has been reached after long experience and observation both ashore and afloat, and substantiated by this year's experiment. This system was an experiment; we discussed it from every angle prior to its institution and then awaited results. They are here reported and the conclusion arrived at is offered.

To mention by name all those who shared in making this experiment a success would require too much space, but the writer feels deeply indebted to the commanding officers of the recruit depot, the base surgeons, and to those dental officers who, through their encouragement and assistance, and their willingness to perform extra work cheerfully, made possible the carrying out of this policy.

RECURRENCE OF INGUINAL HERNIA¹

By K. E. LOWMAN, Lieutenant Commander, Medical Corps, United States Navy

There are perhaps very few subjects of more interest to the naval medical officer than that of the recurrence of inguinal hernia. To prevent this recurrence should be one of the surgeon's greatest endeavors, for in the Navy, where there is the most urgent need of active physical specimens of manhood, such a mishap as hernial recurrence usually, at least in the long run, means the patient's survey out of the service because of physical disability to carry on as is expected and required of him. For, as we know, a hernia after a first recurrence is more liable to a second relapse than is a hernia to a primary recurrence after an original herniotomy.

During the past year there have been performed at this hospital quite a number of operations for recurrent herniae, and we have diligently sought in every case for probable causative factors in these recurrences. The majority of the primary herniotomies were done at civilian hospitals in different parts of the country. Most of the cases, after careful questioning, admitted having been allowed to get

¹ From the Surgical Service, U. S. Naval Hospital, Norfolk, Va.

of bed after such short periods as one to two weeks after operation. Others gave histories of infection following herniotomy. The standing fact, however, that impressed us mostly, was the large number of these recurrent cases which gave histories of early departure from their beds after operation had been performed. Still another feature was noted: In almost every one of the recurrences, *transplantation* of the cord at the primary operation was found. One other case admitted having worn a truss after operation. This was done of his own volition, however, after his having left hospital, and such a procedure was not advised by the operator. The patient merely deemed it a wise thing to do. This instance is added merely to impress upon us the necessity of carefully emphasizing to our cases the importance of postoperative care without recourse to mechanical appliances.

The literature is full of advice as to how to prevent hernial recurrence. In the first place, success of a hernial cure depends upon primary union of the tissues involved. Thorough asepsis should be obtained, the parts severed should be cut with a sharp knife and not rudely and bluntly dissected. If there be excessive fatty tissue, some of it, at least, must be removed, as also any superfluous or loose tissue fragments. Stitches must be firmly tied, not so tightly, however, as to cause tissue necrosis with a consequent future site of lessened resistance. Dressing of the wound should be generously resorted to, and these dressings should be applied with pressure.

Binnie recommends a period of three to four weeks' rest in bed after operation with no bowel movement allowed in an upright posture for the first six weeks following operation. For a period of at least three months after operation no hard manual work should be permitted. It has been our practice to adhere strictly to a three weeks' stay in bed and a fourth week up on a level floor, carefully instructing the patient *not* to go up or down any steps.

Binnie likewise points out the fact that practically "all the good modern operations are based on the idea that the hernia has originally passed through a more or less oblique canal, which it has converted into a ring-like opening, and to effect a cure it is necessary to convert this opening into an oblique canal—narrower and more resistant to abdominal pressure than the original canal had been. All operations which carry out the above principle are successful in effecting cures." Such an operation is the Bassini.

According to the 1923 Yearbook of Surgery, most surgeons admit 5 to 10 per cent of recurrences, all cases considered. After Bassini's operation, according to Da Costa, only 1 per cent of relapses occur. Sixty-five per cent of all recurrences are noted within the first six months of operation, and 80 per cent within the first year. After

two years only about $6\frac{1}{2}$ per cent of all relapses occur. So, therefore, if the patient is well one year after operation, most probably he will remain so.

It is of great interest to note that some authorities give as high as 25 to 50 per cent of relapses after operations for direct inguinal hernia. We are cautioned repeatedly concerning the strict necessity of removal of the sac in direct hernia, no matter how small the sac may be, nor how unimportant it may seem to us at time of operation. Such a removal is essential, as much as in large indirect sacs, otherwise a potential wedge is left to enlarge and separate the repaired structures, and cause by so doing a recurrence of the very condition we have tried to cure.

The greatest cause of hernial recurrence is *sepsis*, and as stated hitherto every effort should be made to prevent this surgical misfortune, for, What is more discouraging than to see a case that promised to result in a good hernial repair go to naught because of an infected wound?

Another necessary precaution in hernial repair is to make sure of the high ligation of the sac. It has been claimed by some surgeons that no other operative procedure in regard to repair of a hernia in children is essential, the high ligation alone sufficing to cure the rupture.

It may be well at this point in our discussion to enumerate the more common causes of recurrence of inguinal hernia. They are as follows:

(a) Failure at operation to remove all the sac: There may be, for instance, an hour-glass contraction of the sac, and we remove only part of it.

(b) The slipping of the ligature from the neck of the sac. This has been proved by surgeons to have occurred.

(c) Faulty closure: for example, neglect to make the cord as small as possible by removing excess fat; or failure to unite firmly the internal oblique muscle and conjoined tendon to Poupart's ligament.

(d) Poorly developed musculature; especially prone to cause relapses in direct inguinal herniæ.

(e) Obesity: The presence of the fat itself locally and the immense intraabdominal tension usually present in very stout patients.

(f) Blood supply. Always save as much as possible, for the subsequent nourishing of tissues involved.

(g) Failure to save the nerves. Care should be exercised never to divide a nerve, particularly the iliohypogastric, as it supplies the internal ring.

(h) Employment of nonabsorbable sutures.

(i) Post-operative cough, vomiting, and retching.

(j) Hematoma.

(k) Traumatism to tissues in general, remembering the slogan "Be kind to nature and she will return the compliment."

(l) Tying deep sutures with such tension as to tear away portions of Poupart's ligament.

Most surgeons agree that for the radical cure of inguinal hernia *the cord should always be transplanted*. It has been the usual thing at our hospital to perform the Bassini operation, both for primary herniotomies and relapses, and it may be added that this operation has proved most satisfactory.

At this juncture the employment of the fascial transplant by Mackechnie in operative treatment for recurrent inguinal hernia may be outlined. In this operation the fascia for the transplant, at the proper time during the operation, is sutured to the under surface of the conjoined tendon, the rectus fascia, and pubes, to Poupart's ligament, and laterally to the region of the deep epigastric vessels. The method has met with considerable success in the hands of the best technicians. This procedure, however, has not been found necessary in our series of cases.

There are of course factors in the operations for inguinal hernia over which the surgeon has no control, such as the age of the patient, his occupation, and the size and the type of the hernia. In order to combat the possibility of recurrence it is necessary to prescribe rules for each individual case.

On the other hand, the surgeon has control over the prevention of such as the following: Failure to recognize and dispose of the sac; infection; use of nonabsorbable sutures; failure to support the wound by proper dressings; and, last but not least, allowing the patient out of bed too soon. To prevent any of the above surgical blunders or misfortunes should be the operator's constant endeavor.

There are noted many differences of opinion as to the time factor after operation. Bassini permits his patients to leave their beds and go to work after the lapse of two weeks. However, Macewen and the great majority of other authorities believe that no wound is firmly healed after so short a time.

Recurrence is more frequent in direct inguinal hernia because of the deficiency of the conjoined tendon. Always in this type the cord must be transplanted, and a fascial flap from the sheath of the rectus abdominis muscle used to procure additional support and firmness to the repair. Recurrence in the direct type occurs at the site of the external abdominal ring, whereas in indirect hernia during relapse the sac may traverse the inguinal canal anywhere from the internal ring down to and even through the external opening.

There is a type of inguinal hernia to which the appellation "saddle-bag" has been given, wherein we have both an indirect and direct hernia. Here it is necessary for the operator to remove both sacs and proceed as heretofore stated in the treatment of the direct type of hernia.

In conclusion it may be suggested that, in so far as is practicable, there should be instituted in our service a "follow-up" system of all our cases of herniotomies as is practiced in our best civilian hospitals. Unfortunately, however, patients rarely carry out their promises of cooperation in this respect. At this institution an effort is made to impress upon all cases that they should keep the hospital informed at various intervals regarding their condition, but in very few instances are we successful in obtaining the desired data. However, we feel that the effort should be made in every case, because if we are only successful in obtaining data for a year after a herniotomy, it would be sufficient to assure us that after a year without relapse the chances are 4 to 1 in the patient's favor against a recurrence.

SOME OBSERVATIONS ON CEREBROSPINAL FEVER

By PAUL RICHMOND, Lieutenant Commander, Medical Corps, United States Navy

During the epidemic of cerebrospinal fever at the United States naval training station, Great Lakes, Ill., beginning February 16, 1926, there were 21 cases with 3 fatalities, excluding 1 case which developed and was treated elsewhere until 24 hours before a fatal termination from myocarditis. Of these, 14 developed symptoms of meningeal infection, while 7 never passed beyond the septicemic stage.

Preceding the epidemic and while it was in progress, many cases of catarrhal fever were also being admitted to the hospital. The prevalence of catarrhal fever is believed to have been an important factor in causing the meningococcus infections.

All meningococcus infections were of recently enlisted recruits with from 1 to 12 weeks' service.

The following signs and symptoms were of most value in the early differential diagnosis of the meningococcus infections:

1. High white blood count with increased polymorphonuclear percentage.
2. Rash; petechial or maculo-papular.
3. Headache followed by mental dullness and confusion and, later, by delirium and stupor.
4. Vomiting, projectile and persistent.
5. Pulse rapid and weak.

6. Pallor.
7. Cervical rigidity and Kernig's sign.
8. Purulent pharyngitis and rhinitis.

During the epidemic all cases admitted with a high fever had an immediate white and differential blood count made. Those with a white count of 15,000 per cubic millimeter or more were isolated as suspects, unless some manifest cause such as an acute tonsillitis or pneumonia was present. This was found to be a practical measure, as uncomplicated cases of catarrhal fever had white counts of 10,000 or less, even when fever, headache, and malaise indicated some more serious illness. Several cases, which later proved to be meningococcus infections, had white blood counts of 20,000 or more, when other symptoms were similar to catarrhal fever. Counts as high as 50,000 per cubic millimeter were found, with 98 per cent polymorphonuclears. Counts between 25,000 and 35,000 were usual, with 90 to 95 per cent polymorphonuclears. Several cases showed an increase of 10,000 white cells per cubic millimeter within a few hours during the early stages of the disease. One case only failed to show an increased white-cell count at any stage. This was a rapidly developing meningeal infection with early delirium and turbid spinal fluid containing many organisms. Serum treatment proved markedly beneficial and prompt cure resulted.

Of over 200 admissions for acute infections, there were only a few having high white counts for which no definite cause was found. Some of these may have been missed meningococcus septicemia infections. Pneumonia and empyema were the only recognized diseases which produced so high early counts as the meningococcus infections. During the epidemic all early white-blood counts of 25,000 or over later proved to be due to pneumonia or cerebrospinal fever, except one case of empyema.

A rash was observed in all but three cases. In 10 cases the rash was petechial in character. The petechial spots varied in size from barely perceptible specks to spots 2 centimeters in diameter. Some cases had a very few small petechiæ distributed over the chest and abdomen. Others had numerous spots of varying size over the entire body, especially noticeable about the eyes. The extent of the rash was not an indication of the severity of the disease. The case having the most pronounced petechial rash had a septicemia only, with arthritis, and, being the first case of the epidemic, was confused with purpura rheumatica or a streptococcus septicemia until the blood culture was found to contain a gram negative diplococcus and meningeal symptoms developed.

Another type of eruption was noted in nine cases. It is described in textbooks as "rose-colored hyperæmic spots." The spots resem-

bled the "rose spots" of typhoid fever or, when more pronounced, an early chicken-pox rash. They were generally distributed but most pronounced on the chest, abdomen, and forearms. This type of eruption disappeared in 24 hours. It was present in severe meningeal infections as well as in the milder septicemic forms.

Severe headache, frontal and occipital, was always present in the early stages of the cases having meningeal involvement, but not in the septicemic form. The catarrhal fever cases often had severe headache. The headache due to meningitis became increasingly severe until the onset of mental dullness and confusion, which were later followed by delirium and stupor in the cases not subjected to immediate spinal puncture. One case passed in three hours from a condition resembling catarrhal fever to a semicomatose state. Spinal puncture, with reduction of the increased pressure, relieved the headache in the early cases and serum prevented the onset of the later symptoms. The serum, after a few hours, in the favorable cases, checked the delirium and brought about a normal mental state, except for insomnia and irritability.

Vomiting was an early and frequent symptom in both meningeal and septicemic types. It was of a projectile character, lasted during the first day or two only and, although it had no special relation to the intake of food, in the severe cases all food or water taken was immediately ejected.

A weak rapid pulse was invariably present early in the course of the infection. Rates of 120 to 180 were usual.

A marked pallor came on as the infection developed. This, when accompanied by mental dullness and a rapid pulse, was very characteristic. Several cases passed in a few hours from a flushed facies with severe headache and restlessness to a condition resembling surgical shock.

Cervical rigidity was present in the meningeal cases, but not until mental symptoms were also in evidence. Kernig's sign was usually indefinite early, when most needed. Other neurological signs were not of help in the early diagnosis.

A thin, yellowish, purulent, nasopharyngeal discharge was present in most cases. In smears, this material showed many pus cells and numerous gram negative diplococci. Blood-agar plates showed almost pure cultures of meningococci. Nosebleed occurred in 2 cases. These were not recognized early and had dry crusts obstructing the nares at the time the nosebleed occurred. The nasopharyngitis subsided in all cases after a few days.

The diagnosis of the septicemic form of cerebrospinal fever was based on finding gram negative diplococci in the flasks of glucose bouillon in which 10 mils of blood had been incubated for periods

varying from 12 hours to 3 days. Later subcultures were made on blood-agar slants. Typical colonies developed and were found to agglutinate with the antimeningococcus serum used in treatment. Blood-agar plates made with the patient's blood were successful occasionally but failed in several cases where the organisms grew in the fluid medium.

The diagnosis of the meningeal form of cerebrospinal fever was based on finding gram negative diplococci in the smears or cultures from the spinal fluid. Six cases showing spinal-fluid infection failed to give positive blood cultures.

In smears of centrifuged spinal fluid, the organisms were mostly intracellular and resembled gonococci. Many pus cells were always present when organisms could be found, although meningococci grew from two fluids with only slightly increased cell counts. The number of organisms present in a smear from the fluid taken before treatment was not of value in prognosis, as the two cases showing the most meningococci recovered and one case in which the meningococci were found only after prolonged search was fatal. However, the cases in which organisms could still be found in smears or cultures after two intraspinal treatments were critical.

Cultures from the spinal fluid grew best when 1 to 2 mls of the fluid was placed on a blood-agar slant. Loeffler's medium was not so satisfactory. Blood-agar plates were not satisfactory as they sometimes dried out too quickly. The spinal fluid incubated in the same sterile centrifuge tubes into which withdrawn showed an abundant growth at times and could be used if other media were not in readiness. Subcultures from the spinal fluid showed typical colonies, which agglutinated with the treatment serum.

All agglutinations were done by Houghton's modification of Krumwiede's method as described in Stitt's laboratory manual. After a little practice this was found to be satisfactory. When 20 to 60 throat cultures were required daily, as well as the other laboratory procedures in connection with the epidemic, a rapid method using a minimum of glassware was needed.

In the early diagnosis, an increased spinal-fluid cell count was the most valuable, as a clear fluid several times showed a cell count of over 100 per cubic millimeter. When the fluid was visibly turbid, the cell counts were very high. An absence of the sugar in the spinal fluid was not found until organisms could be demonstrated. An increase in the globulin took place as the cell count rose. The colloidal gold curve was typical only when the cell count had become high and the globulin increased. Two cases, with marked symptoms, showed all tests normal at the first punctures. No serum was given at that time. Subsequent puncture, a few hours later, in each case showed turbid fluid containing many meningococci.

Early treatment proved much more valuable than that given after the symptoms were fully developed. Two cases were definitely arrested after infection of the spinal fluid had taken place, as shown by cultures, and became convalescent in 24 hours without ever developing a meningitis. Larger doses than usually recommended were given toward the end of the epidemic and cases responded better. Sixty mls of serum at 12-hour intervals for four doses produced the best results where it could be given. (More fluid should be removed than serum injected. No pressure should be used except that produced by the gravity apparatus.) Intravenous use of serum was discontinued when severe reactions were produced in two cases. Doses of 90 to 120 mls of serum were given intramuscularly on the first day. When the blood culture was positive and high fever persisted, the dose was repeated the second day.

Every case to whom serum was given developed a serum rash.

Three cases developed arthritis of several joints. Two of these cases never developed meningeal symptoms. The joints all returned to normal except for partial ankylosis of a middle joint of a finger in one case.

The only case with any residual disability is totally deaf. The deafness is of central origin and came on with the early delirium.

The following procedure of diagnosis and treatment was finally developed:

(1) Any new case admitted to the hospital, having a fever and showing a white-blood count of over 20,000, was considered a suspect and isolated until diagnosed.

(2) A blood culture was made in a flask containing 50 mls of glucose bouillon. Growth of gram negative diplococci was considered sufficient to make a diagnosis and begin treatment.

(3) A throat culture on a blood-agar plate was made and examined the next day for meningococcus colonies. Agglutination of typical looking colonies was done by Houghton's method. Positive results were considered confirmatory evidence only, as many carriers were found.

(4) Whenever clinical symptoms seemed sufficient, a spinal puncture was done. If the fluid appeared turbid, as much serum (up to 60 mls) as would run in with the gravity apparatus was injected. The needle was left in place five minutes. If untoward symptoms (as more rapid or irregular pulse) developed, the container was lowered and fluid withdrawn until symptoms subsided.

Toward the end of the epidemic 30 mls of serum was injected intraspinaly in those cases where the spinal fluid was found to be clear, because four such cases were found to have infection already present or later developed typical meningitis.

- (5) The spinal fluid was examined by:
 - (a) Cultures on blood-agar and Loeffler's slants.
 - (b) Cell count.
 - (c) Globulin test.
 - (d) Sugar test.
 - (e) Gram's stain of centrifuged fluid.
 - (f) Colloidal gold curve.
 - (g) Culture of spinal fluid itself.
 - (6) When turbid spinal fluid was found or when cultures from spinal fluid or blood showed gram negative diplococci, 120 mls of serum was given intramuscularly and repeated in 24 hours unless severe symptoms had subsided.
 - (7) Where meningococci were demonstrated in the spinal fluid after the first puncture intraspinal treatments were repeated with 60 mls amounts, if possible to withdraw an equal amount of fluid, at 12-hour intervals until four treatments were given or until symptoms had subsided (except slight fever). In some cases two or three treatments were sufficient. In others six brought about a cure. Cases doing badly were treated so long as organisms showed in cultures.
- Basal cistern puncture or ventricular puncture should be done in cases not responding to intraspinal treatment as above, especially when at least 30 mls of fluid can not be obtained at each puncture. This was not done in any of these cases, although it is now thought that two of the early fatal cases might thus have been benefited.

THEORIES CONCERNING THE MECHANISM OF THE INSULIN EFFECT ON CARBOHYDRATE METABOLISM¹

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INTRODUCTION

Though the internal secretory function of the pancreatic islands, their degeneration in diabetes, and the fact that insulin will take the place of their secretion have been demonstrated, the fundamental process and the mechanism by which insulin acts still belong, like most of the deeper metabolic operations, to the domain of theory. It is the purpose of this paper to review the theories evolved from scientific investigations concerning the mechanism by which insulin produces its effect on carbohydrate metabolism, but it is fitting first to recall the action of insulin.

The action of insulin is to reduce the sugar content of the blood (1) This action depends primarily upon two factors: First, a decreased sugar output by the liver, which in turn depends upon one of two factors or a combination of the two, an increased glycogenic action

¹ From U. S. Naval Hospital, Chelsea, Mass.

or a decreased glycolytic action. A failure of the liver to convert glucose, brought by the blood vessels from the villi of the intestines, into glycogen, and storage of the same, would result in the glucose passing through the liver and into the greater circulation. The restoration of this glycogenic action would decrease the sugar of the blood. On the other hand, if the glucose were stored as glycogen and again rapidly broken down into glucose the result would be hyperglycemia. Now, if insulin decreased this glycolytic action, the glycogen would remain stored and prevent the hyperglycemia. Second, an increased sugar consumption by the muscles. This is again a dual action and depends upon, first, increased storage of glucose as glycogen; second, increased oxidation of the glucose in the tissues, as shown by an increased respiratory quotient.

HISTORICAL

Probably the first theory suggested as an explanation for the catabolism of the sugars in the body was the dissociation theory conceived by A. P. Mathews (2). His theory was based upon the fact that sugars are weak acids. He thought it probable that they form salts with metals and undergo ionization like other salts. The glucose anion is then subject to cleavage and intramolecular rearrangement. He also suggested at that time that the failure of glucose dissociation may be the explanation of the metabolic phenomena of diabetes; that is, the undissociated glucose, being incapable of combustion, of polymerization into glycogen, or of reduction to fat, accumulates in the form of chemically inert molecules in the cells and fluids of the body.

Lepine (2) suggested that the pancreas secretes an oxidizing ferment (glucose) that directly oxidizes d-glucose.

Naunyn (2) believed that sugars could only be utilized after having been converted into glycogen and that the inability of the body to "fix glycogen" (that is, diazoamyl) was the cause of diabetes.

The colloidal theory advocated by Allen (2), that sugar before utilization must undergo some form of colloidal combination, and that for this purpose an amboceptor supplied by the pancreas is essential, resembles one reasoning by Cohnheim; that is, the pancreas furnishes an amboceptor.

Previous workers, Lepine, Allen, and others, have suggested the possibility that the pancreas plays an important rôle in carbohydrate metabolism, but it was left for Minkowsky (3) to establish definitely the important part played by this organ. However, it was not until Opie, in 1900 and 1901, published the results of his study of the pathology of the pancreas in deceased diabetics, that it was accepted

that the underlying pathology was in the islands of Langerhans and that it was the secretion of these islets that played the great part in the oxidation of glucose and the storage of the same as glycogen.

PRESENT-DAY THEORIES AS TO MECHANISM OF ACTION OF THE SECRETION OF THE ISLETS OF LANGERHANS (INSULIN)

The theories concerning the mechanism of action of insulin which are concentrating much attention at the present time are:

- (a) Cohnheim's theory (Amboceptor-theory).
- (b) Toxic theory (Collip).
- (c) Gamma-glucose theory.

A. *Cohnheim's theory*.—According to Cohnheim's theory (1) both the pancreas and the muscles produce substances that are necessary to normal carbohydrate metabolism. His conclusions were based upon the following experiment. He obtained juice of muscle and of pancreas by a process of pressing and found that—

1. Pancreatic juice mixed with glucose solution did not convert the glucose into CO_2 and H_2O .
2. Muscle juice mixed with glucose solution did not convert the glucose into CO_2 and H_2O .
3. Pancreatic juice mixed with a mixture of muscle juice and glucose converted the glucose into CO_2 and H_2O .

Cohnheim's first explanation of this action was that the muscle supplied an inactive, oxidative enzyme that required a kinase from the pancreas to activate it. This view is analogous to Pawlow's findings regarding the relationship between trypsinogen and proteid digestion; that is, trypsinogen is inactive on proteids but, when in contact with enterokinase, it is converted into trypsin which causes rapid digestion of proteids.

Later work, though, caused him to alter the theory in such a way that it becomes analogous to Ehrlich's side-chain theory. The findings which caused the change in his theory are:

1. The body produced by the pancreas withstands boiling. It is soluble in water and 95 per cent alcohol and is insoluble in ether. From these findings he says it is not a ferment but resembles thyroxin, adrenalin, and secretin.
2. An excess of the pancreatic body hinders, and large quantities prevent, carbohydrate combustion. It is most active when mixed in the proportion 75 grams of muscle and 8 grams of pancreas. This action is analogous to the observation of Neisser and Wechsberg, that the destruction of bacteria by a bacterial serum is due to the combined action of amboceptors and complement and that an excess of amboceptors destroys the bacterial action of the serum.

Cohnheim's latest theory, then, is that the pancreas furnishes an amboceptor which in junction with a complement furnished by muscle, causes glycolysis of glucose.

B. *Toxic theory*.—Collip (4) believes that insulin produces its action by virtue of toxicity. He bases his opinion upon analogy. He found that some toxic substances produce a hypoglycemia. Since insulin also produces a hypoglycemia he thinks its action is similar. The findings upon which he bases his opinion are:

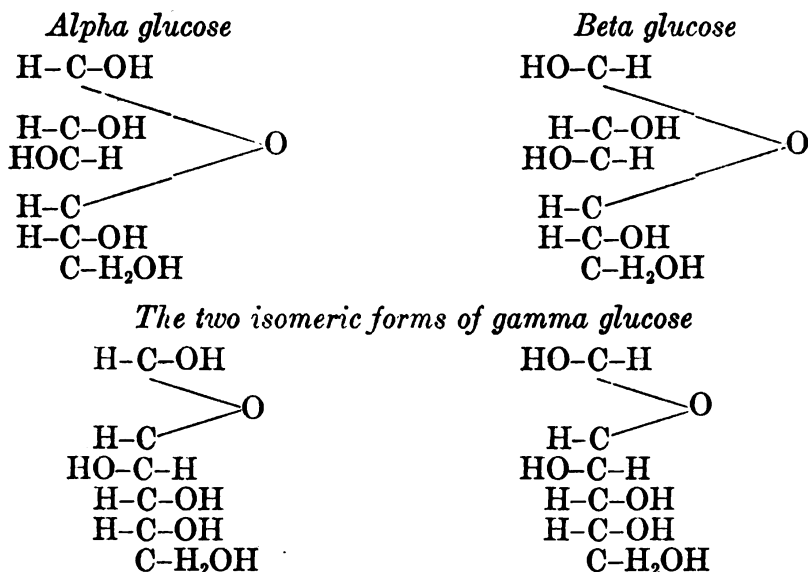
1. Rabbits with cystic livers have hypoglycemia.
2. The blood of a rabbit with a cystic liver when injected into a normal rabbit produces hypoglycemia in it.
3. Administration of plant extract to rabbits produces hypoglycemia.
4. The blood of a hypoglycemic rabbit, in which the hypoglycemia is produced by administration of insulin, will also cause hypoglycemia in a second rabbit if injected into one.
5. Subcutaneous injection of certain guanidine compounds will produce hypoglycemia.
6. The blood of deliverized dogs when injected into rabbits produces a hypoglycemia.

C. *Gamma-glucose theory*.—The principle of the gamma-glucose theory is that the normal blood sugar is gamma-glucose and that insulin converts alpha-beta-glucose into gamma-glucose. The first experiment to point in this direction was performed by Clarke (5) in 1916. It was as follows:

1. He perfused an isolated mammalian heart with Locke's solution and found that the process extracted some sugar from the solution.
2. He determined the quantity of sugar extracted while the heart was doing a definite amount of work.
3. Then he perfused Locke's solution through the blood vessels of the pancreas and then through the isolated heart, this time determining the quantity of sugar extracted from the solution while the heart did the same amount of work. He found that the quantity of sugar extracted was definitely more than in the previous experiment, in which perfusion through the heart alone took place.
4. In order to determine if the increase was due to extraction by the pancreas, he perfused through the pancreas alone and found that no sugar was extracted by that organ.
5. In order to explain the increased consumption of sugar by the heart after the solution has passed through the blood vessels of the pancreas, he examined the reducing properties of the solution before and after perfusing through the blood vessels of the pancreas and also examined its rotary power by use of the polariscope, before and after perfusing. He found that the reducing properties had not changed, but that the sugar had undergone a stereoisomeric change, a downward muta rotation, as revealed by the polariscope. Clarke did not suggest, however, that the change was one from the alpha-beta-glucose to the gamma-glucose.

The next work of note that made an advance toward the gamma-glucose theory was done by Hewitt and Pryde in 1920 (6). They demonstrated that the alpha-beta-glucose when introduced into the intestine rapidly changes into the gamma form. They suggested that this was probably due to the pancreatic secretion in the intestine, as the change did not occur when alpha-beta-glucose was introduced into the peritoneal cavity. They, however, did not suggest that the normal blood sugar is gamma-glucose.

The change that glucose undergoes is expressed by the following structural formulæ:



Later, Winter and Smith (3), in 1922, suggested that the normal blood sugar is gamma-glucose; at any rate, it is some form other than alpha or beta. They base their opinion on:

1. Large quantities of glucose or fructose taken *per os* can not be detected as such in blood of normal persons.
2. Hydrolysis of hexose with phosphoric acid yields fructose (3) (7).
3. The blood sugar of normal persons behaves like gamma-glucose. They also suggested that an enzyme is postulated whereby the alpha-beta equilibrium form of glucose is converted into gamma-glucose and that the absence of this ferment from the blood or its inactivation is the cause of diabetes. They also concluded that this ferment is the active principle of insulin because the administration of insulin to diabetics and depancreatized animals rapidly converts the abnormal alpha-beta-glucose into normal blood sugar, gamma-glucose.

Experiments by Cooper and Walker confirm the conclusions of Winter and Smith. The theory has met opposition by experiments of Alles and Winegarden (8). Their experiments were based upon

the fact that various sugars vary greatly with the nature of the sugar as to the oxidation by iodine in solutions of NaHCO_3 or Na_2HPO_4 ; for instance, mannose is oxidized one-third as fast as glucose and fructose, and sucrose not at all. Their experiments consisted in noting any change in rate of oxidation of glucose under the following conditions:

Glucose solution plus insulin.

Glucose solution plus liver extract plus insulin.

Glucose solution plus blood serum plus insulin.

Glucose solution plus oxalated blood and insulin.

In no case was any difference detected in the rate at which iodine is consumed. They concluded therefore that the insulin did not change the glucose to a less stable form in the presence of insulin and body tissues. It would be interesting to know what change, if any, occurred if they used muscle, glucose, and insulin. Cohnheim stated that when glucose solution, muscle juice, and pancreatic juice (expressed by force) are mixed, the glucose is oxidized to CO_2 and H_2O . Hewitt (9), in 1923, who, with Pryde (6), in 1920, suggested that the alpha-beta glucose is converted into gamma glucose when introduced into the intestine, says that the technique used by Winter and Smith was faulty, and he summarizes his opinion of the work up to the present time as follows:

1. No evidence exists that gamma-glucose is a component of normal blood.

2. Formation of gamma glucose may take place in blood as and when required, but there is no evidence of same.

3. Theories of diabetes mellitus demanding the presence of gamma glucose in normal blood are without experimental foundation.

SUMMARY

Modern theories of the mechanism of insulin effect on carbohydrate metabolism are:

A. *Cohnheim's theory*.—The active principle of insulin is an ambceptor and in junction with a component furnished by muscle converts carbohydrates into an oxidizable form.

B. *Toxic theory*.—The active principle of insulin is a toxin, or at least is toxic, and it exerts a destructive action on glucose.

C. *The gamma-glucose theory*.—The active principle of insulin converts the stable alpha-beta glucose into a less stable form, gamma glucose.

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THE WASSERMANN REACTION FOLLOWING THE USE OF BISMUTH IN THE TREATMENT OF YAWS AND SYPHILIS¹

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The subject of bismuth in the treatment of yaws and syphilis is of particular interest to the Public Health Service of Haiti.

During the last year the Public Health Service has used bismuth preparations almost exclusively in the treatment of yaws and syphilis. This holds particularly true with regard to the rural clinics. At these clinics between 30,000 and 35,000 outpatients are seen every month throughout the Republic; of this number about half receive bismuth injections for yaws and syphilis.

Bismuth, while comparatively a new drug in the field of syphilology, has been well studied as to what constitutes a dose and a course of treatment, and as to its effect upon the Wassermann test. What effect it has had upon those treated in the rural clinics of Haiti is known only through clinical observation.

McCafferty and MacGregor, of the New York Skin and Cancer Hospital, reported a series of Wassermann-fast cases which were treated with bismuth: (1) A course of bismuth consisting of intramuscular injections of potassium and sodium tartro-bismuthate was given twice weekly until 16 injections had been administered. After one course 44 per cent had a plus-minus Wassermann reaction. A second course showed an improvement of 22 per cent over the first course. The average improvement after three full courses was 64 per cent. Twenty-two per cent remained unchanged and 13 per cent reverted. His conclusions were that bismuth should be given to all Wassermann-fast syphilitics; that albuminuria was not produced more frequently with bismuth than with any other antisyphilitic agent; and that there was no untoward effect in bismuth therapy when properly administered.

Simon treated nine cases of syphilis in which the Wassermann reaction persisted in spite of at least two neoarsphenamin series. Some of the patients had been given six series, and even more, sometimes combined with mercury. In four cases the Wassermann reaction became negative (2).

Green's experience with bismuth has been that in primary syphilis the drug has a slow spirocheticidal action as compared with arsphen-

¹ From the Public Health Service of Haiti.

amin, the spirochetes being found in the lesion after the third and fourth injections. In primary and secondary syphilis, bismuth has a slower action than arsenic in reducing the strength of the Wassermann reaction. On account of its slow action in primary and secondary syphilis, bismuth ought not to be used in the abortive treatment of this disease. In cases of latent syphilis which, in spite of extensive treatment with arsenic and mercury are Wassermann-fast, bismuth has a great advantage over other specifics, although mercurio-arseno-bismuth Wassermann-fast cases also exist. Bismuth in conjunction with arsphenamin seems to be more effective than mercury plus arsphenamin in changing the Wassermann reaction. Bismuth seems to be a great help in relieving the pain of patients with tabes (3).

Levaditi, Nicolau, and Schoen (4) have observed that insoluble bismuth salt is retained in the muscle tissue for months and is very slowly liberated, and, owing to this gradual elimination of bismuth, the kidneys are not injured. Minimal quantities of bismuth, however, suffice to destroy the spirochetes.

It might be well at this time to point out the mechanism of absorption of bismuth administered by intramuscular injections, and its mode of action upon the spirochetes at the seat of the primary syphilitic lesions. This was also observed by Levaditi, Nicolau, and Schoen (4).

Five rabbits with primary chancres on the scrotum and seven controls were injected with trepol (bismuth), 0.1 gram per kilogram weight, the former being killed after 1, 2, 3, 4, and 6 days, the controls at the end of 7, 8, 11, 13, 15, 20, and 25 days. The chancres were examined histologically, chemically, and microchemically; the muscles at the site of injection by the first two methods. The results showed that: (a) The amount of bismuth absorbed is minimal, even after a considerable lapse of time; (b) the destruction of the spirochetes in the lesion is effected by the presence of such minute quantities of bismuth as defy determination by chemical method; (c) the spirochetes retain a normal appearance for 24 hours after the treatment, but from the second day they show granular degeneration; (d) bismuth salt is dissociated under the influence of a leucocytic exudation and the metal set free; this unites with proteid substances derived from broken-down leucocytes and is absorbed by mesoclastic cells and vascular endothelium, and thus an infinitesimal amount is carried to the specific lesion where spirochetolysis is effected; (e) the muscle injected at first undergoes coagulation necrosis with myophagy, followed by regeneration commencing on the third day.

The following table shows the results obtained at the Haitian General Hospital, Port au Prince, by the use of mercury and bismuth in treatment of syphilis and yaws.

No attempt has been made to obtain a complete history and record on each case, nor to differentiate between so-called yaws and syphilis. The cases picked have all had open lesions, large ulcers, or very bad deformities, and positive Wassermann reactions at the time they entered the hospital for treatment.

The treatment given at the Haitian General Hospital consists of 1 grain of mercury salicylate in a suspension of liquid petrolatum given intramuscularly each Tuesday, and 1 grain of sodium potassium bismutho-tartate in 2 cubic centimeters of freshly distilled water given intramuscularly each Thursday. The sodium potassium bismutho-tartate contains 67 per cent of bismuth.

Wassermann reaction on admittance to hospital	Treatments (doses received)		Approximate time between Wassermanns	Wassermann reaction following treatment
	Bismuth	Mercury		
			<i>Days</i>	
1. 4 plus.....	14	15	60	Negative.
2. 4 plus.....	11	12	60	Do.
3. 4 plus.....	5	5	30	Do.
4. 2 plus.....	4	4	30	Do.
5. 4 plus.....	6	6	40	Do.
6. 4 plus.....	5	5	40	Do.
7. 3 plus.....	4	5	35	Do.
8. 4 plus.....	5	6	45	Do.
9. 3 plus.....	6	5	55	Do.
10. 2 plus.....	5	4	40	Do.
11. 4 plus.....	6	6	50	Do.
12. 4 plus.....	6	12	40	Do.
13. 4 plus.....	14	8	65	Do.
14. 4 plus.....	7	6	50	Do.
15. 4 plus.....	6	5	45	Do.
16. 4 plus.....	16	16	100	Do.
17. 2 plus.....	5	4	40	Do.
18. 4 plus.....	5	5	50	Do.
19. 4 plus.....	6	5	45	Do.
20. 4 plus.....	5	5	40	Do.
21. 4 plus.....	6	5	40	Do.
22. 4 plus.....	6	6	45	Do.
23. 4 plus.....	5	5	50	Do.
24. 4 plus.....	6	8	40	Do.
25. 4 plus.....	6	5	35	Do.
26. 4 plus.....	6	6	35	Do.
27. 3 plus.....	5	5	40	Do.
28. 4 plus.....	7	8	50	Do.
29. 3 plus.....	5	5	40	Do.
30. 3 plus.....	6	5	40	1 plus.
31. 4 plus.....	6	5	45	Do.
32. 4 plus.....	6	6	54	Do.
33. 3 plus.....	3	3	40	Do.
34. 4 plus.....	4	4	35	Do.
35. 4 plus.....	8	8	60	Do.
36. 4 plus.....	7	7	50	Do.
37. 4 plus.....	6	7	40	Do.
38. 4 plus.....	4	3	30	2 plus.
39. 4 plus.....	4	3	35	Do.
40. 4 plus.....	8	7	40	Do.
41. 4 plus.....	4	4	30	Do.
42. 4 plus.....	4	3	25	3 plus.
43. 4 plus.....	3	3	30	4 plus.
44. 4 plus.....	4	4	35	Do.
45. 4 plus.....	7	7	40	Do.
46. 4 plus.....	4	5	35	Do.
47. 4 plus.....	4	3	30	Do.
48. 4 plus.....	5	5	35	Do.
49. 4 plus.....	3	4	40	Do.
50. 4 plus ¹	4	3	35	Negative.

¹ Case No. 50 had previously received 13 neosalvarsans. Wassermann positive when bismuth treatment started.

The table above shows 60 per cent to have a negative Wassermann, 16 per cent reduced to 1 plus, 8 per cent to 2 plus, 2 per cent to 3 plus, and 14 per cent remained unchanged. Only two of these cases have received salvarsan. How long these cases will remain Wassermann negative is subject for further study. From a commercial standpoint bismuth is by far the best antisyphilitic for Haiti, and from clinical observations it is giving very good results, and its reactions are only slightly more severe than those of sulpharsphenamine, when properly administered.

The administration of sodium potassium bismutho-tartrate is sometimes accompanied by abscess formation. Dr. Irwin Sutton reported a case of gluteal abscess following the intramuscular administration of a bismuth salt, neotrepol, which was used in the treatment of a patient with syphilis. His impression was that the phenomenon was rare. At the Boston Dispensary, where potassium bismuth tartrate was used, they encountered at least 10 such cases. These occurred for the most part in obese women. Compared with the large number of patients that received bismuth injections the cases that developed abscess were few indeed and formed only a small percentage of the total. Nodes appearing at the site of the injection were not uncommon and were also most frequently seen in women (5). It was their opinion that abscesses following injections of bismuth were due, as a rule, to faulty technique and that a small amount of bismuth deposited in the subcutaneous tissues either when the drug is being injected or when the needle is withdrawn may be of sufficient moment to cause the formation of a sterile abscess.

At the Haitian General Hospital we have had four cases of abscess formation. These were examined in an attempt to determine the cause. They occurred for the most part in female patients. The abscesses showed that they were those of necrosis. After some experimental work it was found that these conditions were relieved by giving the same amount of the salt in 2 cubic centimeters of distilled water instead of 1 cubic centimeter.

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THE TUBERCULOUS VETERANS' BUREAU PATIENT

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The Veterans' Bureau patients who have been admitted to the United States Naval Hospital at Washington, D. C., for observation or treatment of tuberculosis have come mostly from the mountainous or rural regions of Maryland, Virginia, or West Virginia, and in many instances have not had many educational advantages.

How to administer the service composed of this type of patient is a problem worthy of a little study and consideration.

Two main problems confront one, the psychology of the Veterans' Bureau patient and the psychology of the tuberculous. The Veterans' Bureau patients may be roughly divided, like the rest of humanity, into two general classes, namely, (1) those who consider others, and (2) those who consider only themselves.

The first class cooperate and cause very little trouble. It is the second class who are the trouble breeders and who create problems with which the administrator has to deal.

The Veterans' Bureau patient is not in the military or naval service, and in many instances would never have been of his own volition, as his life's course was directed in other channels. In many instances he did not take kindly to the service, with its restraints and discipline, and was very glad to sever his connection with it.

Added to this he feels that, according to the act creating the Veterans' Bureau, he is entitled to hospitalization and treatment at Government expense. He therefore comes not as a supplicant but as one who is entitled to what he receives. Frequently, his chief aim being the adjustment of his claim for compensation, which has necessitated frequent examinations and hospitalizations without any material benefit to what he considers his just dues, he is not in a very happy frame of mind toward the Veterans' Bureau or anyone having the remotest connection with it. He is, therefore, if not an antagonistic at least not an enthusiastic patient upon first acquaintance. He is apt to resent having to come again under a modified military discipline and will occasionally remind you that he is not in the service. Here in Washington, where he has easy access to the Veterans' Bureau and to his Congressman or Senator, he is very apt, during this claim adjustment period, to resent any restraint which would prevent him from visiting the bureau or his Congressman whenever he so desires.

It is this type of patient who prevents the maintenance of a sanatorium atmosphere in the tuberculosis wards of a general hospital in Washington. He is not interested in treatment until his claim is adjusted.

Another element which prevents the creation of a sanatorium atmosphere is the well-meant desire of certain charitable bodies to provide entertainment for these patients, resulting in the distribution of free tickets to the theaters in winter, to baseball games in summer, and to football games in the autumn. While this is very commendable in the case of ambulatory patients in other departments of the hospital, it is hardly conducive to the proper observance of the rest treatment for tuberculosis. Yet the tuberculosis patients have the same human desire for entertainment and are just as anxious to receive the free tickets which they know are being distributed to others.

Another type of Veterans' Bureau patient which must be considered is the one with a moderately advanced, very chronic case, who drifts from one hospital to another; who feels that he can never get well and might just as well enjoy life while he may with the money which the Government pays him. Some of these are apt to be liberal patrons of the bootlegger, and occasionally may even be drug addicts. They fully realize that their condition is such that they can not be denied hospital treatment by the Veterans' Bureau in spite of their noncooperation.

Let us now consider the psychology of the tuberculous. Tuberculosis is a dreaded disease. To most people it means consumption. It is a diagnosis, especially in the early stages, that they hate to accept as true. At first there is mental depression, often followed by skepticism. The early symptoms are so slight that it is often difficult to make the patient realize the necessity of prolonged rest when he feels that there is so little the matter with him. There is no difficulty about keeping a patient with pneumonia or any other acute medical or surgical disease in bed. He is too sick to want to get up.

In early tuberculosis the patient is so slightly incapacitated that he can not see the necessity of spending so much time in bed and frequently rebels against it, stating that lying in bed makes him weak and that he feels so much better when he is up and getting a little exercise.

He likewise lacks the mental stimulus incident to acute medical and surgical diseases, that after a comparatively short period of illness he will again be well and living his normal life. Instead he faces a long period of at least semi-invalidism, cut off from family and friends. This, together with the toxic symptoms, tends to make him irritable, hypercritical, and impatient. Trivial incidents which to the normal person or to the acutely sick would pass unnoticed, with him assume undue proportions and are frequently causes for complaint. For instance, some dish will be served at dinner which does not appeal at that time, although it might have been acceptable

at former meals. One patient will push the dish aside and announce aloud that that food is rotten and sour. Immediately that dish is taboo, the meal is disrupted, and the galley staff is in a turmoil. Investigation by the physician in charge may fail to demonstrate anything wrong with the dish according to his sense of smell or taste. The patient may finally admit that he is wrong, but meanwhile the meal has been ruined and the patients are disgruntled.

Incidentally, there are two types of mentality among the tuberculous which are frequently encountered. One is the depressed type, the one who can see no ray of hope. This type is frequently very chronic, such as a tuberculous infection engrafted on an emphysema. He has to be stimulated mentally.

The other is the very optimistic type, who radiates hope until the very last. He is frequently a more acute type, and in spite of the fact that his lungs are full of cavities, still feels that with a change of climate he will get well. He has to be restrained in his desires.

And now a few words regarding the psychology of the physician in direct charge of tuberculous Veterans' Bureau patients. He must not have the mental attitude toward his patients that they are just loafers who are trying to take advantage of a generous Government, but should accept them as honest and sincere fellow men until they prove themselves otherwise. While there is much chaff among the wheat, it is better to find the chaff in our search for the wheat than to overlook one kernel of wheat in our overenthusiastic search for the chaff. He must lend a sympathetic ear not only to their ailments but to their mental worries. He must be painstaking in his medical work, so that they will realize that he is giving them the best that is in him. He must make them feel that he is not just an official, but is human and has their interests at heart.

Having considered the temperaments of the tuberculous Veterans' Bureau patients, how shall the problems which they present be met?

It is our custom, when the patient is admitted, to give him a complete physical examination, during which we spend about one-half hour on the chest alone, charting graphically all of the findings for every interspace anteriorly and posteriorly. We thus have a picture from which we draw our conclusions as to the condition of each lobe of the lungs and of the pleurae. These conclusions are then transcribed on the request for an X-ray examination of the chest. In this way we are not influenced by previous knowledge of what the X ray shows. This method is good for the physician as it makes him painstaking, since he has to commit himself in writing prior to the taking of the X-ray plates. It is also good for the psychological effect it has on the patient, who will frequently state that "This is the first thorough examination that I have had." Thus, you start your association with a more friendly feeling upon his part. Inci-

dentally, upon first meeting your patient do not be deceived or prejudiced by a robust appearance, because what is true in architecture is equally true of the human being, many a structure of noble appearance has rotten foundations.

Should your and his first examination be subsequent to the last date on which he can claim service connection, and your findings be such that you are warranted in concluding that the lesion is of several years' duration, then you should advise the patient about the procurement of affidavits from any physician who has examined him previously or from any of his friends or fellow workers who know that he has been ailing for several years. In this way you may help many a worthy case who, due to his lack of education or ignorance of the law, has failed to receive benefits which are his right.

According to the statements of many patients, it is the custom of most physicians in Government sanatoria and hospitals to refuse to tell the patients what the clinical findings have been in their cases. This is contrary to our belief and our practice. We believe that the patient is entitled to know just what we consider his condition to be. If he has tuberculosis he, of all people, should know it, so that he will know that he should care for himself. Otherwise he will realize too late that he has neglected his chances for a cure. Needless to remark, this does not apply to far advanced, hopeless cases any more than it does to hopeless cases of any type of disease.

Having made your diagnosis (and one should not see tuberculosis in everyone because one is working in a tuberculosis ward, as we have seen cases of pyelitis, hookworm, post-influenzal residuals, cardiac disease, malignant disease of the lungs, etc., sent in diagnosed as tuberculosis), the early cases should be sent to a sanatorium if they will go. Frequently family conditions, etc., may cause the patient to refuse. Then, of course, it is best to keep him in the hospital where you can have some control over him. Advanced cases it is well to keep if they do not insist upon going to a sanatorium, as there is often nothing to be gained by sending them away and much risk is incurred in transporting them. While this raises your mortality rate it is better for the patient, which is of more importance than any local reputation which you may acquire.

The morning sick call should not be just a perfunctory performance. One should be sure to carry his stethoscope, and whenever any patient complains of a pain in his chest he should be examined, as it may be a beginning pleurisy, a pneumothorax, or a beginning pneumonic process.

It is our custom, with those patients remaining with us, to re-examine and rechart their chest findings every three months. As a rule this is often enough, because we are dealing with a chronic

disease with very little daily change. At this time a summary of the subjective symptoms during the last three months is made. This not only keeps the physician in touch with the progress of the patient, but also has a good psychological effect on the patient, as he feels that you are really taking an interest in his condition.

It is important to realize that those having this type of patient in charge have a duty not only to the patient and to the hospital, but also to the community. We must keep in mind that we are dealing with an infectious disease which makes the patient a danger to the community, and that by keeping him under supervision we are accomplishing some good, even though he is far from a model patient. The ordinary medical or surgical Veterans' Bureau patient can be very readily dealt with if he does not cooperate wholeheartedly, because he is a danger to no one but himself; with the tuberculous this is not so.

His complaints should be investigated and the cause corrected, or an explanation given to him as to why his complaint was unfounded. His requests to be allowed to do things which would be harmful to him should not be met with a simple refusal, but with the reason for that refusal, so that instead of a disgruntled patient you will have an understanding and cooperative one.

To put the matter simply, you must give them service.

One must realize that one is not dealing with a military body of men, but with victims of a chronic infectious disease who have no place in a military body. One must learn to temper one's justice with mercy.

One must handle them with a velvet glove beneath which they realize is a mailed fist.

CLINICAL NOTES

OCULAR ENUCLEATION

WITH REPORT OF CASES

By C. B. CAMERER, Commander, and B. P. DAVIS, Lieutenant Commander, Medical Corps,
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The operation for complete removal of the globus oculi was first proposed by Bonner in 1841. Previous to this time extirpation, which practically amounts to a surgical gouging out of the eyeball with Tenon's capsule and its appendages, such as the ocular muscles and orbital fat, was in vogue. In the modern operation, as notably perfected by Berraquez, whose original technique has been modified by Laubers, the globe is "shelled" out of Tenon's capsule, which structure, with the four flat recti muscles, is preserved intact and employed in the formation of a movable stump for the reception of a properly fitted prosthesis.

The operation of enucleation, per se, is indicated in any of the following conditions:

- (a) Irreparable loss of vision, associated with pain.
- (b) Sympathetic ophthalmia of the opposite eye.
- (c) Malignant involvement.
- (d) Extensive traumatism, with laceration sufficient to preclude repair.

Plastic problems in connection with the empty eye socket come mainly under two general varieties. In the much larger class of war injuries, extensive traumas due to explosions, etc., there is often found a deficiency of conjunctiva, resulting in entropion and contractures. The other general class, not so essentially confined to war wounds, etc., present a sunken socket in which the prosthesis tends to recession and immobility.

In cases where the lower cul-de-sac is flattened out until it is on a level with the lid edge a flap of mucous membrane attached to the lower lid may be elevated and tucked down perpendicularly below it into a "pocket" previously prepared for its reception, and held in place by mattress sutures coming out through the cheek. This procedure bids fair to result well in minor cases, but, for the more extensive injuries with marked contractures, the use of the Esser inlay or other approved implants to restore contour and function of the lids is advisable.

Gunshot wounds rarely leave a functioning stump, limitation of motion to the prosthesis being usually marked. Mules's globes, implanted at the time of enucleation, have in certain hands produced satisfactory results, but uniformly better permanent ones may be obtained by the implantation of cartilage or fat. The former may be obtained from extraneous sources, Daugherty, of the New York Eye and Ear Infirmary, successfully making use of beef cartilage, or from the costal "plaque" at the junction of the seventh and eighth costal cartilages. Fat implants are always autogeneous and are preferably taken from the buttocks or abdominal wall. The latter has been used with success for a number of years and has stood the test of time, having the great natural advantage over the Mules's globes in being a living tissue implant and not a foreign body.

In primary enucleation employing cartilage as an implant, stitching the ocular muscles thereto has not given very satisfactory results, the desired motility not uniformly being obtained. Various methods of epithelializing the cavity with thinly cut Thiersch grafts wrapped around a Mules's sphere or one of cartilage have been attempted, but the great difficulties in this procedure are infection and extrusion. Stents prepared by dental means are also made use of, but the results have not uniformly been very encouraging. A prosthesis, specially manufactured, with an elongated stalk, or "shirt-stud" conformation, to fit into the epithelialized cavity is essential, and while a certain degree of motility may be obtained, better cosmetic results may be expected and are secured by the implantation of fat or cartilage at the time of primary operation.

For cosmetic purposes various ingenious methods have been devised, all attempting to impart as natural a degree of motility to the artificial eye as possible, in an effort to avoid the "glassy stare" observed in cases where plastic surgery has not been employed. Among the multitude of procedures advocated only a few selected at random will be here considered:

(a) *Mules's method*.—Spherical bodies of glass (Mules), celluloid (Lang), silver (Kuhnt), gold (Fox and Allport), sponge (Belt), paraffin (Ramsay), etc., have all been inserted into the cavity following enucleation, with the object of producing a large, movable stump. Results following the implantation of any of these foreign bodies are all too frequently disappointing, inasmuch as extrusion is of distressing frequency. Fox reports a higher satisfactory series of successful results than any other operating ophthalmologist.

(b) The transplantation of animals' eyes was first advocated by Chibret, who attempted the implantation of a pig's eye into Tenon's capsule, followed by the work of Rohmer and Lagrange working with rabbits' eyes. Nicolai inserted a freshly removed rabbit's eye at the time of enucleation, employing Lagrange's technique of stitching the conjunctiva to the conjunctival border of the implant, which is done by a purse-string suture to prevent too much sagging of the lower lid. The transplanted eye shrinks somewhat in time, and there is said to be but little danger of infection.

(c) Lagrange implants a live rabbit's eye and attaches the ocular muscles to the posterior pole. Allowing for the inevitable shrinkage, there usually remains a good, serviceable, and movable stump. Eight cases out of a total of eleven operated showed good results after a period of four years.

(d) The Frost-Long operation, with the implantation of a gold or glass sphere in Tenon's capsule following enucleation, is to be compared with Mules's, but the danger of the extrusion of any foreign body is always a contingency to be considered.

(e) In Suker's operation the several ends of the recti muscles are sutured one to the other, after which the conjunctiva which remains following the "circumcision" of the cornea is joined above and below over the muscle stump and secured by a continuous suture, which also attaches the conjunctival covering to the muscle stump.

(f) H. Schmidt first secures each of the recti tendons with catgut and makes a slit in the conjunctiva over each muscle in which the divided conjunctiva is fastened, it being then brought together by means of a continuous suture.

(g) Priestley Smith pinches up a narrow horizontal fold of the conjunctiva over the internal rectus so as to include contiguous fascia and muscle, then he carries a silk suture through the "pinch" and ties lightly. All the other straight muscles are served in like manner, after which the eye is enucleated in the usual way, the conjunctival opening being closed by interrupted vertically placed sutures.

(h) De Schweinitz operates by dividing the conjunctiva as close as possible to the limbus, each rectus tendon being then seized by forceps, stripped off the sclera, and drawn forward to the cut edge of the conjunctiva, where it is sutured with black silk. The globe is then enucleated in the customary manner, hemorrhage from the central artery being controlled by small pledgets of sterile gauze. Following cessation thereof the edges of the conjunctiva are united by interrupted sutures placed horizontally, which sutures also pick up the capsule of Tenon.

(i) Evisceration with insertion of an artificial vitreous—Mules's operation—is indicated only in cases of ruptured or injured eyeballs where the sclera has not been unduly lacerated and the injury is of recent date, staphyloma of the cornea and sclera, complete leukoma, absolute glaucoma, buphthalmos, and nontraumatic irido-cyclitis. The principal contraindications are suppuration of the eyeball, neoplasms, greatly shrunken eyeballs with calcareous or other degenerative changes, sympathetic ophthalmia or irritation, or pathological changes likely to result in the latter condition, extensive injuries to the globe, chronic dacryo-cystitis, and ocular conditions demanding enucleation, especially in the aged.

(j) Fat implantation in Tenon's capsule was originally proposed and first put into practice by Barraquez, Bartels calling attention thereto in 1908. Barraquez's original technique, modified by Laubers, constitutes the modern operation for the formation of a movable stump by the employment of an autogenous fatty implant in Tenon's capsule. It is the method of choice and has been adopted as the routine operation in this institution, and was employed in each instance in the cases reported in this article.

Briefly, the principal steps in enucleation may be given as follows: In cases of a disparity between the size of the eye and the palpebral fissure, a preliminary canthotomy may well be performed. A speculum holds the lids apart, choice being made of one taking up the least room. By means of Steven's scissors the conjunctiva is care-

fully incised all around the limbus, "circumcising" the cornea, so to speak, and hugging it closely, following which blunt scissors or a small Freer submucous dissector separate the conjunctiva from the sclera, well over the points of muscular insertion. By separating the lower half of the circumference first considerable annoyance from bleeding will be avoided. The division of the tendinous insertions of the recti muscles is best accomplished by seizing Tenon's capsule with forceps and dividing it near the insertion of one of the recti, after which a strabismus hook is employed to pick up the tendon, which draws it away from the globe, and while it is thus held it is divided very close to the sclera by flat scissors. It has been found expedient to divide first the tendon of the *internus* in operating on the right eye and the *externus* when operating on the left, following which the other recti are handled in the same manner.

The section of the optic nerve is best accomplished by seizing the stump of the *externus*, which may conveniently be left a little longer, with stout forceps and rotating the globe toward the nose, thus tending to put the nerve on a stretch and also gaining some additional room. The closed blades of strong curved "enucleation" scissors are now carried down around the temporal side of the globe until the tautened nerve is plainly felt, when the blades are opened sufficiently wide to grasp the nerve, which is severed close to the sclera.

The globe is then delivered by traction on the stump by means of the forceps attached to same, together with lifting with the now closed scissor blades. A firm pledget of gauze is introduced in the capsule to control hemorrhage from the central artery, which is not usually very difficult to do, and the obliques and any other adherent strands are snipped off close to the sclera. The field is now ready for the implant, which is best already removed, shaped, and kept in warm saline solution.

Following the enucleation, and as each rectus muscle is cut away from the sclera, a mattress suture of fine catgut is carried through each free end, the loop of the suture being within, with the free ends outward, each pair of free ends being clamped and retracted. Immediately following removal of the eyeball a gauze compress is snugly packed into the empty capsule. The fat transplanted is taken from a convenient site, of a size estimated just to fill snugly Tenon's capsule, but not to overfill it. This transplant, properly shaped, is then inserted in the capsule following the removal of the gauze pledget and control of all bleeding, and the four ends of the flat recti are then snugly tied over it in the form of a cross. The edges of Tenon's capsule are then sutured over the muscles with fine catgut, and lastly the margins of the conjunctiva are coapted over all by means of fine black silk sutures placed horizontally, usually about

10 in number. These silk sutures should be left in for a period of 10 days

While a certain amount of atrophy is natural and to be expected, the employment of the foregoing technique has proved in our modest series of cases to form an excellent bed for an artificial eye. Healing has been uniformly prompt and function excellent.

Under preparation it may be pertinent to warn against enucleation during the prevalence of any near-by infection. The operation, as a rule, should be performed under a general anesthetic. It may be performed under local infiltration analgesia, but Wurdemann points out the severe shock almost certain to follow.

In case of glioma, with the possibility of nerve involvement, the latter may be clamped close to the globe and divided between the clamp and the eyeball, subsequent examination of the stump serving as a guide to its final division.

Should the eye be infected, great care should be taken to prevent its puncture during operation. In case of a soft eye, avoid too firm pressure of the scissors in the act of severing the nerve, as the posterior pole may thus be included in the section and retract out of reach.

The blades of the scissors should not be closed until one is certain they embrace the nerve, as the resultant hemorrhage may prove embarrassing before the nerve can again be located and severed.

Care should be taken in stripping the conjunctiva, as adhesions may render this step difficult, and the formation of "buttonholes" is to be avoided. Should the muscle tendon serving as a retractor happen to tear away, the sclera should be seized with a broad-toothed fixation forceps, which are to be used in its place.

In venturing to report the following series of seven cases, all of which were operated upon at the naval hospital, Mare Island, Calif., by the writers, the comparative ease and simplicity of the technique is stressed. The results have all been highly satisfactory both to the patient and the operator, and excellent function following the fitting of the prosthesis ("Reform" type of artificial eye) has been secured in each instance.

It is believed that special care should be taken in handling these unfortunates who have suffered the loss of an eye, and that every measure possible should promptly be instituted to restore them, in so far as possible, to a natural and lifelike appearance, the morale of the individual being of no small moment. With the employment of the technique outlined uniformly satisfactory results for both the patient and the surgeon may reasonably be expected, even in hands other than those of a specially trained operator.

The following epitomized reports of the cases mentioned above are submitted:

Case I.—H., M. M., Cox. Admitted February 2, 1925. History of wound of O. S. by BB shot in August, 1924. X ray shows it present in posterior chamber. Upon admission, V. A., O. D., 20/20; O. S., faint light perception. Evidence of old iritis and numerous synechiae around pupillary margin, associated with traumatic cataract. Considerable circumcorneal injection and cloudiness of anterior chamber. May 1, 1925, enucleation, O. S., Berraquez-Laubers technique; prior to operation eye totally blind; frequent attacks of pain and acute inflammation. May 11, 1925, stitches out. May 18, 1925, shell fitted; excellent function. May 28, 1925, discharged; wound healed.

Case II.—G., M. E., Q. M. 2c. Admitted February 28, 1925. History of a penetrating wound of the left eye, same date, received while chipping paint with an air hammer, a fragment penetrating the cornea and iris and lodging in the lens, the force of the trauma rupturing the retina and occasioning a severe intra-ocular hemorrhage. Keratotomy performed, traumatized iris excised, and paint scale removed from lens. Following admission, patient had acute intermittent attacks of pain and inflammation, with intense photophobia. V. A., O. D., 20/20; O. S., faint light perception on entry, later complete blindness. Averse to operation. August 13, 1925, recurrent attacks of pain and inflammation; fundus of O. D. shows beginning inflammatory process; operation urged. August 14, 1925, enucleation, O. S., Berraquez-Laubers technique. August 25, 1925, sutures out; excellent motility of stump; shell fitted. October 14, 1925, invalided from the service at own request. Word from this patient one year later reports excellent function.

Case III.—O., W. B., Eng. 1c. Admitted December 15, 1925. Traumatic cataract, O. S., optic atrophy. Examination shows the pupil small, lens opaque, and the iris adherent to the lens. V. A., O. D., 20/20; O. S., totally blind. History of blow by elbow in eye about five months past. About 10 days later patient noted blurring of vision, which rapidly progressed, and in 10 days more he was completely blind in the left eye. Requests operative interference. January 20, 1926, enucleation, Berraquez-Laubers technique. January 29, 1926, stitches out; excellent motility. March 8, 1926, shell fitted. March 13, 1926, discharged; good result.

Case IV.—K., A. I., Civ. Admitted March 11, 1926, with penetrating lacerated wound of right eye with extrusion of vitreous from explosion of a shell primer. Numerous foreign bodies (copper) in vitreous and face. Marked shock. Vision, O. D., blind, O. S. 20/25. Right eye partly collapsed. March 15, 1926, acute inflammation; immediate operation advised; patient very averse thereto. March 24, 1926, enucleation, Berraquez-Laubers technique. April 3, 1926, stitches out; good result. April 12, 1926, shell fitted; excellent motility. April 24, 1926, discharged.

Case V.—H., J. I., C. B. M. Admitted February 4, 1926. Lacerated wound left cornea. Patient received a lacerated wound of the cornea at the corneo-scleral margin which penetrated the anterior chamber from a chip from a marlin spike. V. A., O. D., 20/20; O. S., faint light perception. Definite prolapse of iris through wound. Corneal wound trimmed, synechia released, wound sutured. February 8, 1926, cornea steamy, with circumcorneal injection; iris in good position. February 15, 1926, anterior chamber clearing; lens cataractous. February 23, 1926, acute inflammatory condition subsiding; lens very opaque; vision, faint light perception; X ray shows possible foreign body in vitreous. April 6, 1926, enucleation, Berraquez-Laubers technique. April 16,

1926, sutures out; excellent motility. April 26, 1926, shell fitted. June 2, 1926, to duty.

Case VI.—H., McC., Eng. 1c. Admitted June 28, 1926. History of penetrating wound of left eye by piece of steel in March, 1926, while stationed at Pearl Harbor, T. H. On admission V. A., O. D., 20/20; O. S., very faint light perception. Left eye chronically inflamed; lens cataractous, iris adherent to lens. Right eye shows flushing of nerve head. Operation advised. July 7, 1926, enucleation, Berraquez-Laubers technique; eyeball found partially collapsed and densely adherent to contiguous structures. July 17, 1926, stitches out; re-dressed. August 9, 1926, stump healed; excellent motility; awaiting prosthesis. September 6, 1926, shell fitted; good result. September 10, 1926, to duty.

Case VII.—S., L. O., Ch. Phar. U. S. N. (Ret.). Admitted August 9, 1926. Iritis, chronic, O. S. Upon admission left eye presents a typical picture of chronic iritis of long standing, with obliteration of the pupillary area and dense posterior synechiae. V. A., O. D., 20/20; O. S., faint light perception. Ocular tension increased due to mechanical interference with drainage. Repeated attacks since 1918. Eye chronically inflamed ("Bombé" iris). August 10, 1926, enucleation, Berraquez-Laubers technique. August 20, 1926, stitches out; good result. September 10, 1926, shell fitted; stump healed; excellent function. September 13, 1926, discharged.

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TREATMENT OF AN IRREDUCIBLE DISLOCATED LOWER JAW OF 98 DAYS' DURATION

REPORT OF CASE

By M. D. WILLCUTTS, Lieutenant Commander, Medical Corps, United States Navy

Interest in the following case report is based upon the rarity of failure to recognize the disabling deformity of a dislocated lower jaw and the difficulties always met with in treating old unreduced dislocations. The report is also a tribute to the use of local anesthesia in traumatic surgery.

The great value and true scope of local anesthesia in general surgery, and particularly in traumatic surgery, is as yet not fully appreciated by many of the profession. Given a case of emergency surgery in any region of the body, the choice of anesthesia is usually very lightly considered; routinely the patient is given one of the standard types of general anesthesia. The anesthesia is satisfactory, the operation is completed, and the patient is returned to his bed, having safely

passed the immediate dangers attending its administration. The indirect, later dangers, all well known and unnecessary to enumerate here, are yet to be faced. These handicaps are reduced to a minimum under local anesthesia. The patient's true condition is known at the completion of the operation. In many types of traumatic cases, the patient himself can serve as an efficient assistant of the first order by cooperating in the voluntary manipulations, active not passive, of the traumatized lesion. Difficult identification of tendons, nerves, and important structures may thus be rendered possible. Restoration of function is seen at operation and the prognosis and subsequent treatment established on a rational basis.

Dislocations of the lower jaw are common, estimated as $1\frac{1}{2}$ per cent of all dislocations (1). Few, however, become hospital cases, as the patient usually gains relief from the urgent symptoms by first-aid treatment. The reduction, when the patient is seen early, is readily and easily performed by simple manipulations based on the retention of leverage power in the intact ligaments and muscles. In nearly 800 cases of dislocations collected by Speed at the Cook County Hospital there were only 8 involving the lower jaw (1). Medical literature is not rich in reported cases of old irreducible dislocations of the lower jaw (2). Obviously, the patient wishes and seeks immediate relief, and failure to give early surcease is so rare that the pathology of the disarticulation is seldom seen by exposure at operation.

Luxation is commonly forward and bilateral dislocation forward is more frequent than unilateral. Dislocation may occur backward or outward, and then is frequently associated with fracture (3).

SURGICAL ANATOMY

The inferior maxilla articulates with the glenoid fossa and its anterior edge, or *eminentia articularis*, of the temporal bone. Interposed between the condyle below and the bone above is an inter-articular cartilage. The external pterygoid muscle is inserted into the neck of the inferior maxilla and into this cartilage.

The ligaments are external lateral, internal lateral, stylomaxillary, capsular, and two synovial membranes.

The muscles chiefly involved are the masseter, on the outer aspect, and the temporal, internal, and external pterygoids, on the inner aspect. These are the muscles of mastication and are supplied by the motor branch of the third division of the fifth cranial nerve.

The blood vessels are the internal maxillary artery, with the tympanic, middle meningeal, pterygoid, and buccal branches; the temporal artery and its transverse facial branch. Superficial and deep veins accompany the above-named arteries.



FIG. 1. DISLOCATION 98 DAYS OLD, BEFORE OPERATION



FIG. 2. AFTER REDUCTION BY OPERATION
PROFILE, FACIAL CONTOUR, AND OC-
CLUSION OF TEETH NORMAL, SCARS
LIGHT AND NOT DISFIGURING



The nerves are branches of the facial and the third division of the fifth nerve.

Surface landmarks.—Steno's duct of the parotid gland crosses the ascending ramus of the inferior maxilla horizontally about 2 centimeters ($\frac{3}{4}$ inch) below and parallel with the zygoma, the transverse facial artery lying above and the facial nerve below it.

Movements.—The jaw has four distinct movements, forward and backward, up and down; and two rotary movements, one on a vertical axis through one of the condyles and another on a transverse axis passing from side to side through the inferior dental foramina. The ligaments which limit the movements of the jaw are the strong external and internal lateral ligaments. The anterior is very weak and is ruptured in dislocation. The posterior ligament, though stronger than the anterior, may also be torn. The two lateral ligaments become tense when the condyles slip forward on the articular eminence. In dislocation they remain attached to the inferior maxilla and are rarely ruptured. Davis explains that dislocation occurs when the mouth has been widely opened and the condyles are forward on the articular eminences. Some sudden jar accompanied by contraction, mainly of the external pterygoid muscle, causes the condyle to slip forward just in front of the articular eminence. The condyle, once out of its socket, is kept out by the contraction of the temporal, masseter, internal, and external pterygoid muscles (4).

In the following case, reduction by closed manipulations under excellent anesthesia failed, although the patient cooperated splendidly and both direct and indirect methods were employed. Reduction was accomplished only after complete and simultaneous exposure of the right and left temporomaxillary joints under regional anesthesia by injection of the third division of the fifth nerve at the foramen ovale. The difficulty in reduction was entirely due to the altered lines of muscle and ligamentous pull, with resulting contractions incident to the primary luxation and prolonged disarticulation. The interarticular cartilage of both joints had been carried forward with the condyles to clear the glenoid cavity and to rest finally forward of the eminentia articularis. The glenoid fossae were hollow and empty. The condyles were displaced and fixed firmly forward, held by the contracted external pterygoid muscle and external lateral ligament. Torn fibers of the temporal and masseter muscles engulfed the condyles, nestlike, and the distorted ligaments and fascia were in the process of false joint formation. The coronoid process offered no resistance to reduction on either side. The difficulties were all due to the resistance of the ligaments and muscle spasm from altered lines of contraction.

CASE REPORT

T. W., veteran, admitted with diagnosis, "Post operative lockjaw, following abscess of throat.

Complaint.—Inability to close mouth and to make proper occlusion of teeth. Unable to eat solid foods.

Present illness.—Patient states that on January 19, 1926, his right upper jaw became sensitive from what he thought was a toothache. He was treated at home by poultices and hot compresses for one week, by which time the original condition had subsided, with severe extension of infection to the submental region. Throat and neck swollen, with fluctuation pointing beneath chin. He entered a civilian hospital. On January 27, 1926, the submental abscess was incised and drained of considerable foul pus under general anesthesia, ether. Two through-and-through drainage tubes were inserted into the mouth to emerge on each side of the median line in the submental region. Patient states that before the operation his teeth were in apposition. The operation relieved his infection, but, upon awakening from the anesthesia, he was unable to move his lower jaw, unable to close his mouth. This he thought was due to the two-tube drainage and dressing. He was discharged under treatment to his home February 9, 1926, with drainage tubes out but deformity of jaw persisting the same as immediately following his operation. He states that he had complained of this deformity but was told that the condition was due to several bad teeth and that extraction was advised. At home he was dressed daily for a week by a visiting nurse. Operation wounds then healed but deformity of jaw persisted. He then received several "electrical treatments" at the hospital in the endeavor to relieve the ankylosis. A month followed with no relief and patient finally submitted to another general anesthesia for the extraction of right lower molar and upper left premolar teeth. Deformity of jaw continued unimproved and he again received several "electrical treatments" but without relief. On April 13, 1926, he sought aid from the Veterans' Bureau and was hospitalized here as with postoperative lockjaw following abscess of throat.

Physical examination.—White, male, 34 years, pale, looks weak. States that he has been unable to eat solid food since operation three months ago. Has lost 15 pounds weight. Deformity of face marked by protrusion of lower jaw with dimpling and depression over right and left temporomaxillary joints. Patient unable to bring upper and lower teeth together; there is a full inch forward displacement of lower jaw. There are two operative scars in submental region. General physical examination otherwise negative.

Impression.—Old, unreduced, forward, bilateral dislocation of temporomaxillary joints following ether anesthesia for drainage of submental abscess. X-ray examination showed inferior maxilla dislocated forward at both temporomaxillary joints. No evidence of fracture existed.

Attempts at reduction of the dislocation without anesthesia were futile, the contracted muscles and ligaments holding the condyles firmly forward of the eminentia articularis.

April 20, 1926, the third division of the fifth nerve was injected at the right and left foramen ovale. Anesthesia was excellent and complete within three minutes for the large area supplied by this division of the fifth nerve, including the motor branch to the muscles of mastication. Direct and indirect methods of manipulation all failed.

The left condyle moved slightly downward but resisted every effort at complete reduction. The right condyle held firmly and could not be moved. The patient cooperated and rendered valuable assistance by assuming various positions and exerting strong counter traction. (Danger of fracturing the condyle alone limited our efforts.) The reaction from the manipulations was slight, the jaw was tender but not swollen and remained fixed in dislocation. Open reduction was then consented to.

Operation.—May 5, 1926, the ninety-eighth day of dislocation, regional anesthesia was again obtained by blocking the third division of the fifth nerve at the foramen ovale. Four cubic centimeters of 2 per cent procaine-adrenalin solution were injected at each foramen ovale. The point of entrance of the needle was just below the middle of the zygoma. The needle was inserted in a transverse direction to touch the pterygoid plate and then followed the bony wall for a total distance of slightly less than 5 centimeters (2 inches) from the skin surface. The injections were made slowly, and only after the characteristic radiating tingling confirmed contact with the nerve. Superficial infiltration above the zygoma of 15 cubic centimeters of one-half per cent procaine-adrenalin solution gave immediate anesthesia and relaxation of the entire inferior maxillary region. The right joint was first exposed by an angular incision, the vertical portion beginning at the lower portion of the zygoma and extending vertically downward anterior to the temporal artery to just above the transverse facial artery, a distance of 2 centimeters ($\frac{3}{4}$ inch). The horizontal limb extended forward along the lower border of the zygoma for 5 centimeters (2 inches). This triangular flap was retracted downward and forward. The facial artery, Steno's duct, and the facial nerve crossing the parotid gland parallel with the zygoma were retracted downward with the parotid gland and the lower border of the wound. The joint was exposed, but the condyle still firmly resisted reduction from its position forward of the eminentia articularis, the resistance of the contracted ligaments and muscles being reinforced by the dislocation of the opposite temporomaxillary joint. The method of McGraw (5) failed, the steel hook meeting with such resistance that fracture of the condyle appeared imminent. Both joints were then exposed simultaneously, and reduction was finally accomplished by rocking the two condyles downward and backward into normal position. The coronoid process offered no resistance to reduction on either side. The pterygoid muscles and strong lateral ligaments were not ruptured. The interarticular cartilages followed their respective condyles, and reduction was readily maintained by suturing the anterior capsule and torn fibers of the masseter and temporal muscles. At the completion

of the operation the patient was able to bring all teeth into apposition and to open and close his mouth about 2 centimeters.

The final reduction was due in large measure to the excellent cooperation of the patient which was rendered possible by the local anesthesia. Frequent shifting of head position, tilting of the chin, and essential counter traction were vital factors to success which under a general anesthetic could not have been obtained. Active motion was instituted at once; restricting dressing was not employed. Both operative wounds healed cleanly, and the movements of the jaw progressed steadily and rapidly to full functional recovery.

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TRAUMATIC RUPTURE OF THE SPLEEN

REPORT OF CASE

By L. W. JOHNSON, Commander, Medical Corps, United States Navy

The patient was a fireman, third class, aged 19. While stepping from a dock into a boat his foot slipped and he fell about 4 feet, striking the lower left ribs on the gunwale. He was unable to rise, and was carried to the sick bay, where he was put to bed. He complained of considerable pain in the upper left abdomen and left shoulder. During the day his pulse rate increased from 74 to 100, while the symptoms of shock and internal hemorrhage became more prominent. He was later transferred to the Naval Hospital, Washington, a two-hour trip by boat and automobile.

On arrival at this hospital, 17 hours after injury, he showed evidence of severe shock. His blood pressure was 118 systolic, 86 diastolic. Leukocytes were 13,000 and hemoglobin 45 per cent. The abdomen was distended to a moderate degree and very rigid, especially on the left side. Liver dullness was replaced by tympany, and there was dullness in the left flank, which was not influenced by change of posture. The pulse was 136 to the minute and rather weak. Breathing was entirely thoracic and the facial expression was one of anxiety, though the color of the mucous membranes was not very pale.

Under general anesthesia the abdomen was opened through a left rectus incision. The peritoneum was dark purple, and on opening it blood gushed out and many large clots were seen. The spleen was found to be ruptured and bleeding, so the pedicle was secured and the organ removed. Many large clots were scooped out and the peritoneum filled with warm salt solution as we closed it. Infusion of 1,400 cubic centimeters of warm saline solution was given during the operation.

He reacted poorly after the operation, so shock treatment was continued. At this stage the blood count was 1,220,000 red cells, 16,500 leukocytes, and 55 per cent hemoglobin. He was given a transfusion of 650 cubic centimeters of blood by the citrate method, and showed immediate improvement. Four days later his blood count was 2,620,000 red cells, 12,800 leukocytes, and 62 per cent hemoglobin.

It was our desire to start food as early as possible to help in blood replacement. Liquids, including pressed-beef juice, were given late in the day of operation, but were immediately vomited, and this persisted for two more days. So 1,000 cubic centimeters of 10 per cent glucose solution were given daily, the stomach was washed, and continuous proctoclysis employed. On the third day after operation he was able to retain food, and further convalescence was uneventful. We thought it probable that the ligatures on the splenic ligaments, close to the stomach and at the tail of the pancreas, might cause sufficient irritation to produce the vomiting.

This spleen had the usual transverse rupture above the level of the pedicle and also a longitudinal tear on the gastric surface. The microscopic examination showed that, aside from the injuries, it was essentially a normal spleen.

The course of the blood recovery is shown in the table.

	Red blood count	White blood count	Hemoglobin
Before operation.....		13,000	45
After operation.....	1,220,000	16,500	55
Fourth day.....	2,620,000	12,800	62
Seventeenth day.....	3,700,000	11,600	70

DISCUSSION

The spleen is so soft in consistency that, in considering the effects on it of trauma, it has been likened to a bladder filled with fluid. Pascal's law of hydrostatics, that any pressure exerted on the contained fluid will be transmitted equally in all directions, has been applied in explanation of the rupture. Since the capsule has less resistance to longitudinal than to transverse strains, most tears are

transverse. Tears are usually above the level of the pedicle. They are most common in young people and are rare in otherwise normal spleens.

The essential pathology of rupture of the spleen is hemorrhage, and most of its symptoms are referable to this.

Diagnosis.—Most writers comment on the difficulty of the differential diagnosis of traumatic rupture of the spleen from other abdominal injuries. In this case credit for the very clever diagnosis belongs to Lieut. Commander George B. Tyler, Medical Corps, United States Navy, of the Naval Proving Ground, Dahlgren, Va. Few cases are correctly diagnosed before operation.

In nearly all cases nausea and vomiting, pain and evidence of shock are present. Fortunately these symptoms, following abdominal injury, justify surgical intervention, whatever the lesion may be, so the matter of exact diagnosis is rather academic. Pain radiating to the left shoulder is an inconstant symptom of splenic injuries. An increasing area of dullness in the left half of the abdomen is a valuable sign, if present, but the blood may find its way directly into the pelvis without producing this sign. Obliteration of the liver dullness is not constant and is of value only when it occurs early, before general distention develops. Rigidity and fixation of the abdominal wall with thoracic breathing indicate a deep abdominal lesion and may be very helpful signs.

The blood changes are those of hemorrhage without infection, and are not so marked as one might expect from the volume of blood lost. There is a substantial increase in leucocytes with reduction of red cells and hemoglobin. Butler and Carlson state that "In all patients in which there is a history of traumata to the abdomen, to the flanks or the lower chest, even if there is no visible injury or local evidence of injury, we must always be alert and not overlook the slowly developing shock, the slight distention, and the abdominal pain, not too severe, that are the early signs of rupture of the spleen."

Treatment.—Surgical interference is necessary. Cases have been reported in which the bleeding ceased spontaneously, but later the clots became dislodged and hemorrhage recurred as the patient improved, became more active, and increased his blood pressure. Primary shock may be so severe as to make it advisable to postpone operation until the patient has somewhat recovered. But if no response occurs after two hours of treatment, operation should be done without further delay.

Efforts to suture tears in the spleen have proved unsuccessful because of the friability of the organ. Tamponade is to be considered only as a last resort in extreme cases with extensive adhesions. The pedicle has been tied and the spleen left in place, with

complete recovery of the patient, but this procedure is not to be recommended. Splenectomy is the operation of choice, and should be done in all cases if possible.

Several routes of approach are available. The Bevan S-shaped incision, the oblique subcostal, or the left rectus may be used. On opening the abdomen the pedicle of the spleen should be secured at once as the first step in its removal. Special effort should be made to avoid injury to the stomach and the tail of the pancreas while ligating the splenic ligaments. Arrangements should be made to give blood transfusion or saline infusion during the operation. Butler and Carlson collected the fluid blood found in the abdomen, citrated it, and injected it into the vein during operation.

Results of splenectomy.—Removal of the spleen is survived with no permanent ill effects, but the loss of such a large organ is not without definite changes. Elaborate studies have been made of the effects of removal of the spleen in cases of therapeutic splenectomy in the various blood diseases. Following rupture of the spleen, the results of severe hemorrhage are added to those of loss of the spleen. The return to normal of the red cells and hemoglobin is very slow.

Mayo states that the spleen has three known functions. The first is to filter from the blood stream microorganisms and various toxic agents which it destroys or sends to the liver for destruction or detoxication. The second is to produce white blood cells, one of the most important being the lymphocyte, without which there would be no healing or repair in the body. The third function is to destroy worn-out or deteriorated red blood cells, in the course of which bile pigments are formed. The organ also acts as a reservoir and is an important factor in adjusting the amount of the circulating functional hemoglobin according to the needs of the organism. Aschoff states that, in omnivora, it must be regarded as the principal organ of the reticulo-endothelial system, playing a dominant rôle in the metabolism of iron. Marked disturbance of iron metabolism occurs after splenectomy, with increased renal excretion of iron. This may have some bearing on the slow replacement of the red cells and hemoglobin after traumatic rupture and splenectomy. The functions of the spleen, which are those of the reticulo-endothelial system in general, are taken over by the other units of that system. There is increased activity of the liver, mesenteric lymph nodes, bone marrow, and von Kupffer's striate cells after loss of the spleen. The spleen also helps in the struggle against infection, but the splenectomized animal, if otherwise in good condition, shows no increased susceptibility and the postoperative lowering of resistance is no greater than that after any other severe operation.

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DIATHERMY IN SHOCK

REPORT OF CASE

By G. F. COTTLE, Commander, Medical Corps, United States Navy

Case No. 11586.—I. R., seaman, first class, United States Navy, was admitted to the U. S. S. *Relief*, 10.10 p. m., October 24, 1926, a stretcher case, left leg in splints, with the history that he had received a compound fracture of the left leg, tibia and fibula, in a motor-cycle collision with an automobile several hours before admission. He had been given first-aid care in a hospital ashore, whence, by ambulance, he had been sent to the dock and from there immediately transferred by the patrol officer to the hospital ship, then lying in the harbor of Los Angeles, Calif.

Examination on admission showed him to be in a state of extreme shock. Pallid, with a slightly yellow tint, he lay in an apathetic state, eyes closed as if in sleep, oblivious to his surroundings, responding only by unintelligible mutterings to sharp questioning. He was quite cold; there was no perceptible peripheral pulse. With the stethoscope it was possible to count the faint heartbeats at 140. Respirations were shallow and rapid. He had vomited, and the abdomen was hard, tense, slightly distended, and tender to pressure over the spleen. The red blood cells were 4,450,000; hemoglobin, 90 per cent; the urine contained a few red blood cells.

Diagnosis.—The signs of intra-abdominal injury, vomiting, tense tender abdomen, combined with the clinical picture of shock, made the observers think of rupture of either the hollow or solid abdominal viscera. The blood count being not below normal, massive hemorrhage from a ruptured spleen or liver seemed ruled out. Rupture of the intestine could not be ruled out, but the degree of shock constituted a definite contraindication to exploratory surgery. The small amount of blood in the urine seemed to prove that the kidney was injured somewhat. It was believed the patient had sustained a crush of the abdomen sufficient to cause, perhaps, multiple small hemorrhages into the retroperitoneal tissues, with inhibition of the sympathetic nervous ganglia there located, and that this condition

was responsible for both the extreme degree of shock and for the signs somewhat indicative of injury to the abdominal viscera. The diagnosis reached, therefore, was shock, complicating compound-fracture left tibia and fibula, with, in addition, the possibility of injury to the abdominal viscera.

Treatment given was rest in the recumbent position, morphine, heat applied externally by hot-water bottles under blankets, saline infusion, 800 cubic centimeters with adrenalin, followed by hypodermoclysis of 5 per cent sodium bicarbonate. For a few moments following the adrenalin there was a reappearance of a barely perceptible pulse at the wrist, but this improvement did not last. About one and one half hours after this treatment had been instituted he was seen in consultation by four of the medical officers of the hospital ship, who agreed that the patient's condition was too critical to allow of any treatment except that of the shock itself. At the time of this consultation the blood pressure was 60/40, and his general condition was considered to be worse than on admission. It was the opinion of all that not only was his condition extremely critical but that, in spite of the treatment already given, he was getting worse, colder than he had been, heart sounds more faint.

Crile, whose writings for many years have influenced the profession in their treatment of shock, published in the February, 1926, number of *Surgery, Gynecology, and Obstetrics* an article entitled "The use of diathermy and of the quartz lamp for conserving the temperature of the viscera and promoting the welfare of the patient before and after abdominal operations." It occurred to the consulting group in this case that this patient, apparently in extremis, might be benefited by this method of application of heat directly to the region of the liver. The measures already instituted seemed destined to end in failure. The clinical record of the treatment then instituted is brief:

2 a. m.: Pulse by stethoscope, 140. Diathermy to liver region, 30 minutes.

6.45 a. m.: Pulse by stethoscope, 138. Blood pressure, 70/50. Diathermy to liver region, 60 minutes.

8.30 a. m.: Pulse by stethoscope, 130. Diathermy to liver region, 60 minutes.

10 a. m.: Pulse perceptible, 128. Blood pressure, 60/40.

11.15 a. m.: Pulse palpable, 124. Blood pressure, 58/35.

4 p. m.: Pulse palpable, 130. Blood pressure, 78/50.

Dry, 8 by 10 centimeter plates, placed one in front and one behind over liver area, were used; 1,200 to 1,500 milliamperes.

From this time on the condition slowly improved, but so slowly that even on the third day after the injury a medical officer unfamiliar with the case said he considered him to be still in a serious and dangerous state of shock. Not until the tenth day after injury

did he seem sufficiently improved to warrant removal of the temporary wooden splints to permit resplinting and dressing care of the compound fracture of the leg.

The clinical record does not show the striking phenomena that occurred during the application of diathermy. After the current had been passing for about 10 minutes the respiration gradually deepened; the cold, dry skin became slightly moist, then covered with sweat; the pulse became just palpable, first in the temporal artery, then at the wrist. As the diathermy continued his body became gradually warm, he moved his arms about, opened his eyes, and spoke a few intelligible words. In all, diathermy was given three times for a total of 150 minutes. The subsequent applications were given because the improvement obtained each time did not last, as shown by a gradual weakening of the heart sounds, disappearance of the peripheral pulse, deepening of the state of apathy, and a return of the sense of cold to the palpating hand. The periods of improvement were much longer than that obtained by adrenalin, but it seemed necessary to repeat the treatment to maintain the improvement. During each application of diathermy the same cycle of symptoms occurred, first deepening respiration, then return of pulse at wrist.

In Crile's book on Surgical Shock, published in 1921, the clinical phenomenon of shock are given as follows:

1. Reduced metabolism.
2. Loss of body heat.
3. Loss of muscular power.
4. Loss of mental power.
5. Increased respiratory rate.
6. Increased pulse rate.
7. Lowered arterial tension.
8. Cold and moist skin.
9. Pallor—sometimes a yellowish tint.
10. Shrunken facies.
11. Cyanotic nails.
12. Dull listless expressionless eyes with heavy lids.
13. Diminished reserve alkalinity.
14. Concentration of blood—relatively high red blood count.

The treatment of shock given in that book is as follows:

1. Physiologic rest.
2. Warmth.
3. Large quantities of fluid—by mouth, rectum, and subcutaneously.
4. Elevation of the foot of the bed.
5. *In absence of cyanosis*, large doses of morphine.
6. Transfusion of blood.
7. Nitrous oxide anesthesia.
8. Local anesthesia.
9. Quick, deft, light operation.

Summary.—This patient recovered from a most extreme degree of shock and is now convalescing satisfactorily. It is believed diathermy to the liver region contributed largely to this recovery. The case is reported in the hope that it may stimulate interest in the further use of diathermy, thereby helping in the solution of the problem of the best treatment of shock. Have we in Crile's suggestion to apply heat directly to the liver in addition to the usual means of applying heat to the surface of the body, a valuable new additional remedy for shock?

SPONTANEOUS RUPTURE OF THE HEART

WITH REPORT OF CASES

By G. W. COOPER, Lieutenant (Junior Grade), Medical Corps, United States Navy

Heart rupture is here considered under three headings:

- (1) Incidence and history.
- (2) Pathology.
- (3) Case histories.

Spontaneous rupture of the heart is an interesting and rare condition. This infrequency and pathologic interest have caused the writer to prepare this paper, the objects of which are:

(1) To present the important points in history, incidence, and pathology of the condition, as these three phases are of special interest. Diagnosis, prognosis, and treatment call for little comment, if any.

(2) To present two cases not yet recorded in the literature. Both were attended by the writer at the time of death, and, as the true cause of death was not clear in either case, autopsies were done on both. The first case is of recent date on the U. S. S. *Antares*; the second occurred in a civilian hospital where the writer was interne at the time.

INCIDENCE AND HISTORY

Heart rupture is seldom found in civil-hospital records. Two authorities recently expressed the opinion that the cases are being missed in private hospital practice. Certain it is that these cases are more frequently found in the records of institutions where necropsy is the rule, and in those of institutions for the insane, coroners' services, State, county, or city hospitals, and so forth. Case 2 occurred in a county hospital.

Quain reviews, in the *Lancet*, 100 cases. This series showed the sexes about equally divided. In 218 cases of a group presented by Nuzum and Hagen (1), the males numbered 122 and the females 96. The writer's two cases were males of advanced age.

Incidence is preponderantly greater after 60 years, with second frequency between 50 and 60 years; third frequency is between 80 and 90 years; fourth frequency between 40 and 50 years. This age data is the result of analysis of 247 cases in which age is mentioned.

A total of 327 cases are recorded in the literature. This figure includes five cases presented by Nuzum and Hagen in a recent paper and the two cases presented in this paper.

The recent paper just referred to points out that while "numerous individual and collected reports of spontaneous rupture of the heart may be found, yet a comprehensive study of this subject is lacking in the English literature." If this be true—and it appears to be—it is of interest to learn what some of these reports without comprehensive study have to say about the etiology and pathology of the condition.

ETIOLOGY AND PATHOLOGY

H. A. Hare wrote of rupturing heart aneurysm and spontaneous rupture without aneurysm as stages in the same process.

Three conditions may develop in such sacs. They may give way under pressure, causing sudden death. they may become filled with a clot, or their walls may be calcified. Sometimes an aneurism of this sort forms in the septum and ruptures into the right ventricle.

In some cases the aneurysm may be due to fatty degeneration, without primary vascular disease. * * * A softened spot in the heart muscle may bulge under strain, and rupture may occur before any real sac is formed. This is commonly called rupture of the heart, and usually involves the anterior wall of the left ventricle near the septum; but it may affect any part of the walls of the cardiac cavities.

The aneurysms of the heart septa here mentioned are exceedingly rare, while rupture of such aneurysms is indeed a curiosity, for death by rupture of cardiac aneurysms is not so common as might be supposed; resemblance in this respect to arterial aneurysm is therefore noted. Legg reports 60 cases, only 6 of which died by rupture. As to aneurysms of cardiac septa, Hall reports only 2 cases recorded in the literature over a 20-year period.

Heart aneurysm, like spontaneous rupture, also affects the ventricular wall. Hall collected records of 112 cases, showing location as follows: Ninety-two cases in left ventricle, 1 case in right ventricle, 2 cases in left auricle, 15 in ventricular septum, and 2 in auricular septum.

The older texts give essentially the same opinion as the newer, but not in so great detail. Dr. Hans Schmaus (2), of the Pathological Institute of Munich, and Dr. A. E. Thayer, of Cornell Medical College, say:

Cardiac aneurysm.—In consequence of weakening of the heart wall the blood pressure may produce a bulging of a certain part, with thinning, and this

is called a cardiac aneurysm. The acute form follows ulcerative endocarditis or simple myomalacia, especially when an inflammatory process attacks the myocardium, and in such cases there may be actual perforation of the organ. In a similar way the chronic aneurysm develops because of lessened resistance in parts which are the seat of fibrosis or infarct. Most often the chronic form occurs in the distribution of the left coronary artery (descending branch). On the internal aspect there is usually a deposit of fibrin, which may adhere closely to the wall.

Syphilis of the heart, once thought to be the commonest cause of heart rupture, now ranks second in etiologic frequency, as shown by this later and larger series compiled. Osler (3) says of heart syphilis that sudden death is frequent, and he gives a series by Mracek in which it occurred in 21 of 63 cases.

Rupture may take place, as in the cases reported by Dandridge and Nalty. Myocarditis is common; there may be fatty degeneration and fibroid changes. Changes in the blood vessels of the walls of the heart are common both in congenital and acquired syphilis, even in cases without clinical symptoms or gross lesions. (Adler.)

Obstruction of a coronary artery is the most frequent fundamental pathology. Thrombosis results in infarction and myomalacia cordis. The softened and weakened heart wall ruptures.

Nuzum and Hagen state:

The common predisposing cause, which was responsible for 226 of the 325 ruptures from which this study was made, was an embolism, or an atheromatous sclerosis and thrombus formation in a coronary artery or arteries, resulting in an anemic infarct.

Anemic infarcts have been recorded as myomalacia cordis in many of the autopsy reports. Various other names are applied to this local pathology resulting in coronary occlusion, some of which are ischemic necrosis, coagulation necrosis, and fatty degeneration. As fat globules are deposited in the damaged muscle cells of an area with impaired blood supply, the process is called fatty degeneration by Quain. MacCallum (4) describes a stage of "coagulation necrosis" in which a ferment forms, coagulating the intra- and extra-cellular fluids and forming a firm coagulum which, in turn, is softened by the action of the phagocytic ferment.

Now comes the stage of thinning and weakening heart wall—quite susceptible to aneurysm formation and the alternative, perforating dissection. In the latter case the blood dissects an irregular cavity in the softened heart muscle and the detritus of necrotic tissue and blood clots accumulate therein. Rupture occurs next. The longest diameter of the ruptured area is usually parallel to the long axis of the heart. This was observed in the writer's cases. Rupture may be single or multiple. (One of the writer's cases was single—the other multiple.) Size of the hole in the wall varies from a milli-

meter to 5 centimeters. The location may be in any area of the heart wall—even in the septa or valves, though rarely, as already pointed out. The anterior wall of the left ventricle, near the septum, is the most frequent site. Then, in order of frequency, the situation is, posterior wall of left ventricle, right ventricle, right auricle, left auricle, septa, valves.

Klionsky reports an unusual case wherein nature shows an effort toward repair, and the events in the pathology of this condition do not pass on in the usual sequence nor do they progress to the usual end-result—myocardial rupture. The untoward signs point to a seemingly new and capricious combination of circumstances, both as to anatomical distribution and clinical course developing upon the basic pathology. The case is one of ischemic necrosis of the myocardium accompanied by remote emboli. There were precordial pain and sudden loss of consciousness for two or three hours.

The next evening the man had amaurosis and right internal strabismus. The heart's action was weak, and there were no signs of valvular disease. There was no paresis anywhere else at that time, but he complained of severe headache, especially in the occipital region, which continued for two or three days. Examination of the fundi showed multiple hemorrhages and extensive edema of both retinas. The systolic blood pressure was 110 millimeters of mercury. No abnormality was detected in the urine. The blood urea was normal and the Wassermann reaction negative. The Röntgen ray showed slight enlargement of the first part of the aorta. There was no history of rheumatic fever. The patient gradually recovered, the retinal edema slowly disappeared, and the hemorrhages became absorbed. The strabismus also soon disappeared.

Klionsky feels that this case illustrates a sequence of events somewhat as follows: Atheroma of the first part of the aorta, with probable involvement of the coronary arteries; either thrombosis of a branch of a coronary artery or embolism due to the separation of a small plaque in the aorta; ischemic necrosis of the heart muscle supplied by that branch; deposition of clot on the inner surface of the heart wall resulting in the formation of emboli in the brain (one causing strabismus) and in the retinal arteries (causing hemorrhages, with secondary retinal edema).

Spontaneous rupture in those under 30 years of age is almost without exception due to syphilitic myocarditis. As this condition may show no gross pathology, all ruptured hearts, in cases without a well-defined reason for rupture, should be examined microscopically. (Rupture is recorded in several cases showing no gross heart pathology otherwise, and without a diagnosis of syphilis.) The syphilitic myocarditis findings are unmistakable. There are areas of coagulation necrosis, fatty degeneration, lymphocytic, plasma cell, collar-infiltration, proliferating fibroblasts, and large, pale-staining, unequal-sized, endothelial cells (Warthin) (5). Special

staining, as by the method of Warthin and Starry, shows the ubiquitous spirochete.

Gumma is a much less common syphilitic process causing rupture of the heart. Only one case could be found in this series.

Malignant endocarditis ranks third in the etiologic frequency of this series. The series shows only one case, however, making it decidedly a less frequent cause than syphilis.

Practically in every case of ulcerative endocarditis vegetations are present. In this form the loss of substance in the valve is more pronounced, the deposition—thrombus formation—from the blood is more extensive, and the microorganisms are present in greater numbers and often show increased virulence. Ulcerative endocarditis is often found in connection with heart valves already the seat of chronic proliferative and sclerotic changes."

In this form, then, there is "much loss of substance which may be superficial and limited to the endocardium, or, what is more common, it involves deeper structures and not infrequently leads to perforation of a valve, the septum, or even of the heart itself. (Osler.)

One other terminal condition of much interest conforms in many respects to aneurysm of the heart wall and spontaneous rupture. The resemblance accounts for the confusion in the interpretation of terminal symptomatology and the designation of cause of death, where autopsy is not performed, for the terminal signs and symptoms are parallel, as well as gross and microscopic pathology. The terminal pathology here referred to is spontaneous intrapericardial rupture of an aortic aneurysm. A most interesting case has been reported recently by Gluck—an infant, "aged 20 months, with enlarged glands and general cretinous appearance, died in the hospital suddenly. Examination did not include a Wassermann test, nor would either parent consent to a blood examination, but when the child was in hospital on a previous occasion the entry stated 'liver enlarged, congenital specific.'" (This case report was by letter to the editor, *British Medical Journal*, London, 1925, I, 553. Details not recorded.)

Medical records of the Union Army in our American Civil War of 1861 show three cases of aneurysmal rupture into the pericardial sac. Under the heading "Aneurism" these cases appear in Part Third, Medical Volume, Medical and Surgical History of the War of the Rebellion (6). The text is as follows:

Smiley referred the occurrence of aneurism of the aorta to the overtaking of young or enfeebled men beyond their powers of endurance. The accuracy of this observation can not be verified by the data at command; but it seems highly probable that the violent cardiac action, frequently incident to active service, was the cause of sudden death in these aneurysmal cases. A few instances of rupture appear on the records:

Case 1.—Private Patrick Fletcher, Company H, Fourth United States Cavalry; age 42; died suddenly while in camp, December 9, 1863. He had not

been at surgeon's call during his service of over 10 months in this regiment, but a comrade stated that he would occasionally place his hand to his side, complain of pain, and remark that he would die of disease of the heart. He had previously served five years in the Third Artillery and five years in the Second Infantry. On the day before his death he marched with his regiment a distance of 25 miles. It rained all day and was very cold, nearly freezing. He, like everyone else, had to sleep on the ground in wet clothes. Next morning a march of 5 miles was made, and the regiment went into camp. Fletcher, while assisting to pitch a tent, fell down and gasping once or twice, died. Post-mortem examination: Neck swollen as though the blood vessels were engorged. The pericardium was smooth and healthy but was enormously distended with 28 ounces of blood clot and serum. The heart was of natural size, but the walls of the left ventricle were thicker while those of the right appeared somewhat thinner than usual; the endocardium and valves were healthy. In the aorta, about an inch and a half above the valves, was an aperture a quarter of an inch in diameter, opening into an aneurism the size of an egg, the walls of which adhered firmly to the superior cava and pericardium and were as thick as those of the aorta itself except at a point where rupture had taken place into the pericardial sac. (Specimen 965, Med. Sec., Army Medical Museum.) The left pleura was adherent, and the lung engorged with venous blood; the right lung was healthy, although much compressed by the liver, which was so engorged as to reach the lower border of the third rib. The spleen was enlarged; the kidneys healthy.—Acting Asst. Surg. Thomas Bowen, Fourth United States Cavalry.

Case 2.—Pvt. William Cunningham, Company A, First Maryland; age 22; while on guard, June 27, 1865, fell to the ground insensible and expired in a few minutes. It was reported that for some time before his death he suffered much from mental depression. Post-mortem examination: There was great venous congestion of the brain and lungs, with distention of the large vessels of the neck. The pericardium was distended with blood which had escaped from a small aneurism of the aorta situated just above the semilunar valves; the sac of the aneurism communicated also with the pulmonary artery. (Specimen 558, Med. Sec., Army Medical Museum.)—Surgeon Aaron Ansell, First Maryland.

Case 3.—Pvt. William Robison, Company C, Fifth Pennsylvania Reserves, was admitted February 19, 1863, with a dislocated ankle. He died suddenly March 26. Post-mortem examination: Body well nourished. The brain and lungs were healthy. The pericardium was much distended by 6 ounces of reddish serum and a clot, 9½ ounces in weight, completely surrounding the heart; the right auricle was thinned toward its appendix; the lining membrane of the left auricle was pale and roughly areolated; the cardiac valves were healthy. The aorta was congested and atheromatous, as were the great vessels arising from its arch. On the posterior surface of the aorta, about 2 inches from the semilunar valves, was an aneurismal tumor with a cavity as large as a black walnut, communicating by a minute valvular opening with the pericardium.—Lincoln Hospital, Washington, D. C.

Military medical records of the Civil War give only one case of spontaneous rupture of the heart, according to the recent search made by the writer (see Medical and Surgical History of the War of the Rebellion, Maj. Charles Smart, Surgeon.) The text is as follows:

Notwithstanding the excitation to which the muscular substance of the heart was subject in the exhausting exercises of the field—notwithstanding,

also, the irritable condition just described, the flaccidity and degeneration so common after attacks of typhoid and other adynamic fevers, and the dilatation, believed by Taylor to be consequent on pulmonary obstructions—rupture of the heart must be considered as phenomenal. The following is the only recorded case:

Private William Sands, Company A, One hundred and forty-seventh Pennsylvania, was admitted May 7, 1863, with a flesh wound of the thigh, received at Chancellorsville on the 3d. The patient seemed in good condition and complained of nothing apart from his wound. On the morning of the 15th, Dr. A. P. Williams having been called to see him, found him so near death by asphyxia that no opportunity was afforded to examine the chest during life. At the evening visit on the previous day the patient had some fever and complained of restlessness, for which an opiate was administered. About midnight his mind wandered somewhat, but not more than might be attributed to the opiate. After this the nurse on duty noticed that his breathing was short and somewhat labored; but as he was quiet and made no complaint, the attending surgeon was not called. Post-mortem examination: The ball, which had impinged on the femur without fracturing it, was removed from the wound, which showed nothing unusual. On elevating the sternum the thoracic cavity was found filled with black blood. The lungs adhered to the walls of the thorax and the diaphragm; the pericardium to the pleura and the diaphragm; these adhesions were firm and extensive. The heart, enveloped in its pericardium, was carefully removed; the pericardium was firmly adherent to the heart. An opening nearly half an inch in length was found extending through the anterior wall of the right ventricle and its adherent pericardium. On stripping off the pericardium, the heart, which was of large size, appeared paler than natural, having evidently undergone fatty degeneration; the opening in the wall of the ventricle was in the direction of the muscular fibers and was rendered valvular by the intrusion of one of the fleshy columns. Every point in the case shows that the cause of death was rupture of the heart not following any violent exertion. The nurse's statement that she noticed the short breath of the patient some hours before death, and his asphyxiated appearance when Doctor Williams saw him, indicate that death was caused by the gradual effusion of blood compressing the lungs. The man probably lived four or five hours after the rupture of the heart, the columna carneae at the base of the opening preventing an immediately fatal hemorrhage. The opening in the pericardium and heart could scarcely have been made by the knife of the dissector without inflicting injury on the fleshy column at the base of the opening, which, it will be observed, was uncut; nor would the chest have been suddenly filled with blood by a post-mortem cut in the right ventricle, in which was found a large soft clot.—Asst. Surg. Alexander Ingram, United States Army, St. Aloysius Hospital, Washington, D. C.

CASE REPORTS

Case 1.—P. S. G., ex-cabin steward, United States Navy, white, elderly male; appearance of about 55 years of age. Born in Sweden, July 17, 1864. Total service in United States Navy, 14 years. Married; no children.

Exitus sudden and without witnesses. So far as is known to the writer there were no alarming or warning predeath signs or symptoms. The deceased was found dead about 10 a. m., October 16, 1925, in the cold-storage plant of the

U. S. S. *Antares*. His head and body were in the chill room and his feet were in the ice box; he must have fallen backward and into the chill room upon taking one step into the ice chamber. All doors were open and there was no evidence of gas, other poison, or foul play. Last seen alive, at work, outside the cold-storage room at 9 a. m., this date.

Chief complaint.—None. No complaints of any illness had ever been given to the medical officer of this ship. There was no record of A, RA, or ACD aboard this ship.

Previous illnesses.—No record.

Past history.—Record uncertain as to childhood diseases. There was no history of venereal disease. Operated upon in 1923 for hydrocele of tunica vaginalis. Uneventful recovery. Herniotomy in 1908. Otherwise negative.

Present illness.—Began three months ago, U. S. S. *Barry*, with pain across both ankles. After a hard day's work patient notices pain in the calves of both legs and across the small of his back.

Physical examination.—Eyes react to light and accommodation. Hearing, both ears impaired. False teeth, upper and lower plates. Throat: chronically inflamed, tonsils small and buried. Neck: negative. Abdomen: obese, scar of former right side herniotomy. Genitals: Scar on right half of scrotum, result of hydrocele operation. Right testicle larger than left. Extremities: Knee jerks normal. Bilateral third degree fallen arches. Patient has difficulty in rising on toes of his feet. Left foot is worse than the right.

December 15, 1923.—Wassermann negative. Urine negative. Physiotherapy ordered.

December 19, 1923.—Returned to duty; it is believed that the age and condition preclude efficient work on details like his former one, though no recommendation for a change is made. It is believed that he will do better work on a larger ship. No abnormality save his pes planus and the usual physical changes in one of his age was noted.

Family history.—Not recorded.

Habits.—No alcohol. Tobacco, not excessively (pipe and cigars). Was a hard worker and appeared well preserved and robust for his age. Was a heavy eater. Tendency to the plethoric type. General hygiene good. Oral hygiene fair; superior and inferior plates with 15 natural teeth.

Physical examination.—None made at time of final illness.

Diagnosis.—Not made at time of death. As the cause of death was obscure, autopsy was performed and the anatomical diagnosis made as follows: Rupture, nontraumatic, spontaneous, of left ventricle of heart. Contributory cause: Myocarditis, chronic, with marked fibroid and fatty degeneration.

Treatment.—Although life was apparently extinct, all effort was made to revive the subject as soon as he was found in the ice room. Artificial respiration was begun at once, after removal of dental plates. Blankets and hot bottles were applied. Iced-towel stimulation to thorax and extremities. Sub-marginal massage of heart attempted. Cardiovascular support by injection of caffeine and adrenaline.

Upon attempting the "inspiratory" dilatation of the anal sphincter the writer found it to be already completely relaxed.

Board of inquest reported death to be in the performance of duty and the cause of death as recorded above under diagnosis.

Case 2.—C. F., born in North China. General appearance, very emaciated and weak. Elderly, male Chinese—apparent age, 60 years. True age could

not be obtained. Patient unable to give date of birth. Occupation, cannery worker, formerly in Alaska and later in California. Resident of Alameda County, Calif., for past 39 years. Speaks very little English. Unmarried.

Chief complaint.—Soreness in chest. Cough.

Present illness.—Suddenly became sore in chest yesterday. He was in his room at home at the time. Pain was not preceded by any injury. Unable to get true character of pain but it appears to be a dull, constant soreness in precordium with an occasional sharp, shooting quality. Has been coughing for three or four months; no blood, apparently. Sometimes there are night sweats.

Past history.—History of measles and smallpox; not certain at what ages. No apparent sequelae.

Family history.—Not available.

Habits.—No information of value elicited.

Physical examination.—General appearance, poor—elderly, weak, emaciated, and reclining prone and listlessly in bed. Pallor of facies. Ears very pale; lips moderately so. Head and neck: Contour, normal. Bald. Ears, normal—function good. Nose, normal—septum straight, nares clear. Eyes react sluggishly to light, but pupils are regular and uniform and both are contracted somewhat. Arcus senilis present and there is bilateral cataract. Muscle balance, normal. Mouth: Tonsils, atrophic and appear dormant. Gums, edentulous but otherwise negative. Thyroid gland, negative. No tracheal tug or venous hum. Thorax: Contour, poor. No muscle spasm. No râles, impaired resonance upon percussion, nor fremitus changes. Breath sounds, normal. Heart sounds, none can be heard. No impulse or impact made out. Moderate enlargement of cardiac area to the left. There is also some widening of the aortic area of dullness. No adventitious sounds could be made out. Abdomen: Scaphoid tendency. Panniculus scanty. Liver enlarged—reaching to near the mid-line and to within about 2 centimeters of umbilicus; firm consistency with smooth, regular outline. No signs of tumefaction, tenderness, rigidity, or free fluid. Genitalia: Undescended testicle, left. Otherwise normal. No scars made out. Extremities: Normal. Vascular system: B. P., systolic 104, diastolic 74. Peripheral pulses not obscured but are generally weak; they are regular in rate and rhythm. Normal synchronicity of peripheral pulsations and right arm pressure does not vary materially from left. There is some "beading" and tendency to "pipe-stem" at the radial pulses. Myoneurological: Patellar and other peripheral reflexes active and bilaterally about equal. No signs of upper motor neuron lesion elicited.

Diagnostic impression at admission examination is recorded as chronic myocarditis with passive congestion of liver and angina pectoris, arterial sclerosis.

Progress notes: Second day.—Heart found moderately dilated, but to the left only (2 cm. to left of left nipple line). Heart sounds very weak and heard only intermittently. Rate and rhythm apparently regular but patient is too weak to study response of heart to exercise. Arteries at wrist are tortuous and sclerotic; pulsations very weak. No adventitious heart sounds. Blood pressure, 98 and 58. Liver enlarged almost to umbilicus, firm, and tender.

Third day.—Röntgen ray report shows fusiform dilation of the aortic arch. Marked asthenia and patient invariably in recumbent position. Slight cyanosis of buccal membranes and finger tips. Some dyspnea, at times increased, but not to a distressing degree. Other findings remain as at examination 24 hours ago except that blood pressure is now 70 and 50 with pulse irregular but without characteristic rate or rhythm.

Fourth day.—Findings much the same as at the previous 24-hour period except that the 4 p. m. temperature is 98.8, pulse 86, respiration 20. This temperature is the highest recorded during the entire course under our observation (five days). Temperature shows otherwise consistently subnormal, while pulse and respirations show above normal. Blood pressure has risen to 100 and 54. (These changes here noted in vital forces might at first be interpreted as favorable, but they are merely the undependable results of the usual heroic and useless treatment extended the last-minute retreat of the heart-disease patient to the clinic.)

Fifth day.—Died at 6.02 a. m. As the true heart condition, which proved to be the immediate cause of death was obscured, an autopsy was fortunately consented to.

Anatomical diagnosis.—Healed tuberculosis of lungs, chronic diffuse nephritis, arterial sclerosis, coronary sclerosis and occlusion, spontaneous rupture of the left auricle of the heart (multiple).

Micropathological report.—The microscopic examination of the section of kidney submitted from the autopsy shows a marked dilatation of all of the urinary tubules, with atrophy of the epithelial cells lining same. In many places there is a complete destruction of the intertubular wall. Many of the epithelial cells lining the tubules are in a state of cloudy swelling, this condition existing in the convoluted tubules, as well as in the connecting and collecting tubules. In the locations where the cloudy swelling is most marked, there is considerable desquamation. Diagnosis: Chronic diffuse nephritis.

Specimens were taken adjacent to an auricular rupture, the wall of the heart in the neighborhood being soft, and almost black. Microscopic examination shows an area of heart muscle in which the cells are slightly granular, separated by a clear mass of tissue debris with many red blood cells, and innumerable granules of brown pigment. On the surface there is a considerable amount of fat. Diagnosis: Hemorrhagic infarct of the heart (auricular).

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MERCUROCHROME-220 SOLUBLE, FOREIGN PROTEIN, AND SUGAR IN ACUTE GONORRHEAL URETHRITIS, WITH A STUDY OF THE BLOOD CELLULAR CHANGES DURING THE REACTION

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The value of mercurochrome 220, soluble (1), intravenously administered in local and generalized infections, has definitely been demonstrated by numerous workers. Its action in the treatment of

acute gonorrheal urethritis has not been so striking, though it proved of such value as to warrant further study. One of us (2) reported some 20 cases treated with 1 per cent mercurochrome intravenously administered in acute gonorrheal urethritis. Recently Potter and Redewill (3) have devised a method of treatment in which they utilize the action of a nonspecific protein and sugar solutions to increase the efficiency of the drug. Their results were apparently so good that it was decided to make a study of this form of treatment in the genitourinary department of the field hospital, First Brigade, United States Marine Corps, Port au Prince, there being ample opportunity for such a study in Haiti, because of the large percentage of the native population infected. Our present study, however, is solely among the Marine and Navy personnel at this place, and limited to volunteers having a definite acute gonococcus infection of the urethra. Indeed, after the first case, patients began to ask for the treatment.

In view of the previous observations of many workers, relative to the changes taking place in the tissues after foreign protein therapy, and the injection of glucose and other sugars, it was thought that a study of the changes taking place in the white cells might prove of interest. Chart 1 shows the differential counts following successive injections in 10 patients. Chart 2 gives the data on 25 cases treated by this method, with the temperature, reaction, and clinical progress.

The method outlined by Potter and Redewill was closely followed, with the exception of the tests devised by them to determine the amount of the drug excreted. These latter tests were dispensed with because of lack of facilities, but the urine was closely watched after each injection, with the results as recorded in Chart 3.

METHOD OF TREATMENT

1. Mercurochrome-glucose solution:

1 per cent mercurochrome in 50 per cent glucose solution.

2. Milk-lactose-glucose solution:

Condensed milk.....	c. c.	250
Water.....	c. c.	250
Glucose.....	gms.	50
Lactose.....	gms.	50

Sterilize in the autoclave at 15 pounds for 10 minutes. (Potter and Redewill recommend cow's milk and condensed milk, of each 250 c. c.)

Each patient was tested for sensitiveness to nonspecific protein by injecting, intracutaneously, 0.2 cubic centimeters of the milk solution and waiting 30 minutes for reaction. If none appeared, the first injection of mercurochrome-glucose solution was given, 10 cubic

centimeters intravenously. Immediately following the mercurochrome, 5 cubic centimeters of the milk-lactose solution was injected intramuscularly in the gluteal region. Before treatment each patient received a cathartic and no breakfast, injections being given at about 8 o'clock a. m.

Temperatures were taken every hour following and, with few exceptions, did not exceed 100° F., the majority ranging around 99.8° F. Initial blood counts were made just prior to the first injection, and again at 10 a. m., 11 a. m., 12 m., and again at 8 a. m. the following day. Injections were repeated every 48 hours, and the amounts gradually increased if improvement was slow.

TYPES OF REACTION OBSERVED

A majority of the patients noticed an increase in the amount of urethral discharge in from one to three hours following the first injection, and in several the discharge stopped entirely at that time. None of the patients complained of nausea, vomiting, or diarrhea. This latter observation is quite different from that reaction seen when straight mercurochrome is administered. The following two types of reaction were most often noticed:

1. Slight rise in temperature (99° F. to 100° F.), increasing gradually to about 101° F. by evening.
2. Moderate temperature (101° F. to 103° F.), with malaise, slight headache, and occasional muscular pains. One patient had a distinct chill, with a temperature of 102.4° F., and another was slightly delirious, with a temperature of 103° F.

Most of the temperatures had returned to normal by midnight, and on the following morning all felt very well and began to notice a decrease in the amount of discharge.

A few injections were given with plain mercurochrome and milk, without the addition of the sugars, and it was found that the clinical improvement was just as rapid, the blood changes the same, and the reaction no more severe. However, it is thought that the sugars should be included for their action in warding off anaphylactic shock.

THE URINE FOLLOWING INJECTIONS

The morning following the injections each patient was given 60 cubic centimeters of magnesium sulphate, and a sample of urine was sent to the laboratory. Chart 3 shows the result of chemical and microscopical examinations. Very few specimens showed even a trace of albumen after the third injection. Several specimens were a distinct orange color, with a greenish sheen on the surface by reflected light.

DIFFERENTIAL BLOOD CHANGES

The average first leucocyte count showed about the following proportion:

Total white count.....	7,500
Polymorphonuclears.....per cent..	65
Lymphocytes.....do.....	27
Eosinophiles.....do.....	2
Mononuclears and Trans.....do.....	6

In the first hour following the injection the majority of the bloods changed as follows: Decrease in the total white count, decrease in polymorphonuclears, increase in lymphocytes, and increase in eosinophiles. This does not show so well in the combined chart giving the average of all as in individuals who reacted strongly. In the third or fourth hour following, there was usually an increase in the total white count, polymorphonuclears, and eosinophiles, with a decrease in lymphocytes. The following day the total white count was much higher than before the injection. A noteworthy change was the steady increase in eosinophiles for the first few hours, but dropping as soon as the polymorphonuclear and total white count increased, in one instance reaching 14 per cent, and usually about 4 to 6 per cent.

An illustration of the latter condition is shown in case No. 5, given below:

	8 a. m.	10 a. m.	11 a. m.	12 m.	8 a. m. following day
White cells.....	10,450	5,500	5,850	5,400	12,950
Polya.....	60	60	52	66	60
Lymph.....	30	28	30	24	34
Monos.....	8	6	4	4	5
Eosin.....	2	6	14	6	1

Showing an increase in eosinophiles in the first 4 hours, with decrease in total white cells.

CHART 1

[Average count on 10 patients with injection given at 8 a. m.]

	8 a. m.	10 a. m.	11 a. m.	12 m.	8 a. m. next day
White cells.....	7,497	7,025	7,612	7,602	10,152
Polya.....	65.8	67.1	67.62	70.6	70.1
Lymph.....	27.3	24.04	24.2	22.2	22.72
Monos.....	4.6	5.3	4.5	3.5	4.3
Eosin.....	2.3	3.56	3.68	3.7	2.88

CHART 2

Case No.	G. C. smear	Maximum temperature (degrees F.)			Number of injections	Remarks
		1	2	3		
1	Positive...	99.0	100.0	100.0	4	Epididymitis and orchitis, as well as discharge, disappeared.
2	do.....	99.0	99.0	99.2	3	Discharge stopped, urine clear.
3	do.....	99.0	101.0	100.0	3	Do.
4	do.....	99.0	99.2	99.0	3	Do.
5	do.....	102.0	100.0	102.4	3	Do.
6	do.....	99.0	99.6	99.2	3	Do.
7	do.....	103.0	101.0	103.4	3	Do.
8	do.....	100.0	103.0	102.4	3	Do.
9	do.....	99.2	99.0	99.6	3	Do.
10	do.....	99.6	99.0	100.2	3	Do.
11	do.....	99.0	102.0	100.2	3	Do.
12	do.....	100.0	102.0	100.8	3	Do.
13	do.....	98.6	99.0	99.0	3	No discharge after first injection.
14	do.....	99.0	99.2	100.0	3	Do.
15	do.....	99.0	100.0	98.6	3	Do.
16	do.....	102.4	100.0	99.0	3	Sharp chill and discharge stopped after first injection.
17	do.....	101.0	101.2	101.0	3	Good reaction, improved.
18	do.....	99.0	99.0	99.2	3	Discharge practically stopped after third injection.
19	do.....	103.0	102.6	102.8	3	Discharge stopped after third injection.
20	do.....	99.0	99.2	99.0	3	Slight, clear discharge after third injection.
21	do.....	99.2	99.0	99.0	3	Discharge stopped after third injection.
22	do.....	99.0	99.4	99.6	3	No discharge after first injection.
23	do.....	99.0	99.4	99.6	3	Do.
24	do.....	99.0	100.0	99.8	3	Slight chill, no discharge.
25	do.....	99.0	100.2	99.0	3	Do.

CHART 3

[Chart showing cases with abnormal urinary findings. Cases not shown had normal urine on three examinations]

Case No.	Number of injections	Albumen	Reaction	Sugar	Microscopical
1	3	Very faint trace....	Acid....	No.....	Few pus cells.
3	1	do.....	do.....	do.....	Many pus cells.
6	1	do.....	do.....	do.....	Few pus cells.
10	1	No.....	Alkaline	do.....	Normal.
15	1	do.....	do.....	do.....	Do.

Cases 1, 3, 5, 7 and 10 had an orange-colored urine 24 hours after the injection on two occasions, which, color had a greenish sheen on the surface when seen by reflected light. Cases 1, 3, and 6 were given straight mercurochrome and milk without sugars.

FOLLOW-UP TREATMENT

All of the patients were instructed when discharged from the hospital to return in 15 days for reexamination, including prostatic massage, urinalysis, and smears, to determine the permanency of the cure. These will be reexamined from time to time and a compilation as regards the duration of the cure on a number of cases will be reported at a later date. Those cases having a coexistent chancroidal infection, with negative dark-field examination and Kahn reaction, are instructed to return for later blood examination to prevent overlooking possible luetic infection.

Two of the cases treated had epididymitis, acute, and orchitis.

CASE REPORTS

Case No. 1.—W. F. S. Gonococcus epididymitis, orchitis, and urethritis. After the first injection his discharge increased considerably, and after this there was no change until the third injection, when it was noticed that his testicle was becoming softer and smaller. After his fourth injection the epididymis became normal in size and the testicle almost normal. A few days later he was discharged from the hospital with no symptoms and his urine clear.

Case No. 17.—J. J. Admitted with diagnosis of hydrocele. No fluid obtained on aspirating, but on examination of the prostate it was found to be enlarged and boggy. Patient's urine was clear, no urethral discharge, and he denied previous venereal disease. However, prostatic fluid was positive for gonococci, and he was given the mercurochrome treatment. After the first injection he developed a discharge, and in 48 hours after the second injection his testicle was much reduced in size, the discharge continuing, but negative for gonococci. After third injection the testicle was normal, no discharge, urine clear.

Typical temperature changes are seen in Chart 4, which shows the reaction of a series, some of whom are taking their first, second, and third injections, and giving, under "Remarks," their condition the morning following the injection.

CHART 4

Case No.	Number of injections	Reaction (amount)	Temperatures after injection					Remarks
			1 hour	3 hours	5 hours	7 hours	9 hours	
8	2	Moderate...	99.2	99.0	100	101	102.0	Discharge stopped.
11	2	...do.....	99.0	99.2	101	102	102.0	Do.
12	2	None.....	98.6	99.0	99	99	99.0	Do.
13	2	Slight.....	98.0	99.2	101	102	101.0	Do.
14	3	Severe.....	99.0	100.2	101	103	103.0	Uncomfortable, but no discharge.
15	3	None.....	98.4	98.8	99	100	100.6	Discharge stopped.
16	1	...do.....	99.6	99.0	99	99	98.6	Slight discharge.

CHART 5

Name	Date of discharge from hospital	Date treatment completed	Urethral discharge	Urine	Smear	Complications
F. S.	June 18, 1926	June 17, 1926	None.....	Clear.....	Negative....	None.
O. H.	June 26, 1926	June 18, 1926	...do.....	...do.....	...do.....	Do.
J. H.	June 12, 1926	June 8, 1926	Yes.....	Cloudy.....	Positive.....	Do.
G. M.	June 22, 1926	Feb. 21, 1926	None.....	Clear.....	Negative....	Do.
R. F.	June 25, 1926	June 17, 1926	...do.....	Cloudy.....	...do.....	Do.
A. S. ....	...do.....	...do.....	...do.....	Clear.....	...do.....	Do.
A. A. S.	June 18, 1926	...do.....	Slight.....	Cloudy.....	...do.....	Do.
J. J. ....	...do.....	...do.....	None.....	Clear.....	...do.....	Do.

Shows the result of the treatment to date as determined on follow-up examination. It has been impossible to reexamine all the patients because of transfers, discharge, etc., but the results in a few cases are given. The treatment is being continued and a later report will show the result over a period of time, to determine the permanency of this method of treatment.

SUMMARY AND CONCLUSIONS

1. The method of treatment with mercurochrome devised by Potter and Redewill was tried in the 25 cases reported in this paper.

Three injections were found to be sufficient in the average case to cause disappearance of discharge and to clear the urine. Patients with complications required one or two more injections to clear them up. The sick days ranged from 6 to 10 days. The results obtained were extremely satisfactory.

2. Patients treated by this method received no treatment by mouth and no urethral injections of any kind.

3. Following the injections there was a uniform change in the leucocytes, consisting of a negative phase in which all types of cells except the eosinophiles and lymphocytes decreased, and followed by a positive phase in which these decreased and the other cells and the total white count increased.

4. An artificial immunity to infection is apparently established by the injection of these substances, as evidenced by rise in temperature, negative phase followed by positive phase, and an appreciable leucocytosis lasting for some days.

5. Practically the same results were obtained with the mercurochrome and milk, without the addition of sugars, but it is recommended that the latter be employed as a protective agency against possible anaphylactic shock.

6. A complete bibliography on the use of mercurochrome-220, soluble, in infection, and on the injection of foreign protein, is given in the article by Potter and Redewill.

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GLANDULAR FEVER WITH INGUINAL ADENOPATHY

REPORT OF CASE

By C. C. YANQUELL, Lieutenant (Junior Grade), Medical Corps, United States Navy

First described by Pfeiffer in 1889, glandular fever is probably a clinical entity, an acute infectious disease of unknown etiology, occurring principally in children and young adults, and characterized by a rapid enlargement of the lymphatic glands, usually the cervical. So constant is the cervical glandular involvement that most observers regard this feature as an essential part of the syndrome, although

axillary, inguinal, femoral, and mesenteric glandular enlargement are often a concomitant feature.

The following case report of inguinal adenopathy with fever and abdominal distress can probably be classified as glandular fever, in spite of the lack of cervical glandular enlargement. None of the literature reviewed presents a like condition.

CASE REPORT

W. E. D., A. M. M., 1c., married, white, aged 28, was admitted April 13, 1926, complaining of pain in the groins and lower abdomen. The temperature was 100°, and the patient seemed to have but moderate malaise. The inguinal glands were moderately enlarged bilaterally and rather tender to palpation. They were discrete, with no tendency toward suppuration. No external focus of infection was apparent. The axillary and cervical glands were not involved. The abdominal examination showed no palpable tumors or areas of tenderness. The pain was not severe and soon shifted to the left upper abdominal quadrant, where it remained during the course of the illness. No signs of a respiratory infection were present, and the pharynx was normal in appearance. The temperature was irregularly remittent, averaging 101.6° in the evening and falling to normal in the morning. On the fifth day the left eye showed a low-grade catarrhal conjunctivitis.

	Blood counts		P. M. N.	Lymph.	L. Mono. and Trans.	Eos.	Bas.
	W. B. C.	R. B. C.					
Apr. 15.....	11,300		<i>Per cent</i> 88	<i>Per cent</i> 19	<i>Per cent</i> 9	<i>Per cent</i> 2	
" 17.....		4,820,000	85				
" 18.....	13,000		65	19	15		1
" 28.....	7,500	4,400,000	70	22	6	2	

¹ Hemoglobin.

By April 21 the inguinal glands had subsided and the temperature was normal. Stools were negative for ova and parasites; sputum negative for tuberculosis bacilli; urine, normal; and the Kahn blood test for syphilis, negative. No blood culture was made.

Inguinal and femoral glandular involvement in glandular fever, without other adenopathy, apparently has been observed by Jamison (1), and Baumgartner (2) states that the disease may affect any or all of the lymphatic glands. Incidentally, the latter reports a case of a child upon whom a preoperative diagnosis of acute appendicitis was changed to glandular fever upon finding a normal appendix and enlarged mesenteric glands.

The abdominal pain in the case reported above was considered due to mesenteric glandular swelling. One of the early observers, West (3), stated that he could palpate the enlarged mesenteric glands in some of his cases. Pain in the midline below the umbilicus is regarded by Tidy (4) as being especially significant of mesenteric

involvement. Morse (5) describes left-sided abdominal pain in most of his cases.

The blood picture of glandular fever has not been thoroughly studied. The results published thus far are of more interest to the hematologist than to the clinician. The case series studied by Tidy and Daniel (6) showed a moderate increase in the number of white cells. An absolute lymphocytosis is said by them to be the general rule, but it may be transient, slow of development, and not always present at the onset. A typical case of Tidy's showed: W. B. C., 8,300; Pmn., 52 per cent; Eos., 1 per cent; Lymph., 37.5 per cent; and L. Monos., 9 per cent. The mononuclears had a deeply staining cytoplasm and an irregular, notched, and eccentric nucleus. Gilbert and Coleman (7) found essentially the same results as Tidy, and most of the other observers who mention blood findings simply note a leucocyte count of 11,000 to 25,000, with no mention of a differential count. The most interesting point about many of the reported differential counts is the relative and absolute increase in the mononuclear cells. There is no general agreement on this point, for apparently the large mononuclears are grouped with the lymphocytes in some of the published results. The case here reported shows a noticeable increase in the number of large mononuclear cells with a very moderate leucocytosis. The blood counts in the infectious mononucleosis series of Longcope (8) show a striking increase in all mononuclears and are of interest because of the suggested identity of this condition with glandular fever. He observed cells of the Riedel type.

The etiology of glandular fever is unknown. Bloedorn and Houghton (9) isolated a spirillum from the mouths of some of their cases of acute benign lymphoblastosis which resembled that found in Vincent's angina. It is possible that they were dealing with the same condition that Longcope reported, an unusual form of glandular fever. Gilbert and Coleman found a hemolytic streptococcus in pus from an axillary abscess and from the mouth of one of their cases. Suppuration of the glands in glandular fever is so excessively rare as to cast doubt on the diagnosis, however. Biopsy of glands in one or two instances has shown nothing of interest.

The diagnosis is usually made by exclusion. The conditions to be considered are secondary adenitis, syphilis, tuberculosis, neoplasm, the leukemias and pseudo-leukemias, climatic bubo, malaria, appendicitis, influenza, and pestis minor.

The treatment is symptomatic and the disease is rarely fatal. Convalescence is generally slow. Our patient complained of some abdominal discomfort for several weeks after his discharge from the hospital.

The complications are few but interesting. Enlargement of the spleen and liver has been noted in many instances. Mackey and Wakefield (13) noted jaundice with their case of glandular fever, probably caused by biliary obstruction from enlarged mesenteric glands. Hemorrhagic nephritis has been reported as a sequel in children. Tonsillitis is rare, even with extensive cervical glandular involvement.

When the condition is better understood, the name glandular fever will probably be displaced by a more applicable term. At present it is simply recognized by many clinicians as a pathological process involving the lymphatic system which may be responsible for many obscure cases of fever. It is reasonable to suppose that some undiagnosed attacks of abdominal pain are manifestations of glandular fever with limited glandular enlargement.

Summary: A clinical case of glandular fever is reported which is quite unusual in that the inguinal glands were the only ones of the superficial groups involved.

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A CASE OF ACQUIRED HYDROCEPHALUS

By E. C. WHITE, Captain, Medical Corps, United States Navy

This case is briefly reported because of its comparative rarity and its unusual history.

Hydrocephalus as a sequel of epidemic and tuberculous meningitis, and as a complication of tumors and cysts of the brain, is not in-

frequent; but it is usually obviously secondary to, and its symptoms obscured by, those of the primary condition.

In the case reported there was no history of any primary condition, and the complete history of the case comprised only the symptoms of a gradually increasing intracranial pressure. It was only at autopsy that evidence of a tuberculous meningitis was discovered.

Dandy and Blackfan have divided all cases of hydrocephalus into two groups, obstructive and communicating. In the obstructive type the fluid can not escape from the ventricles because there is an obstruction somewhere in its usual path. The fluid is retained within the cavities of the brain and never reaches the subarachnoid spaces at all. The spinal taps are dry and when phenolsulphonephthalein is injected into the cerebral ventricle it does not appear in the spinal fluid. In the communicating form, which is commonly the result of meningitis with adhesions obliterating the meshes of the arachnoid and cisternæ, the passage of the fluid into the subarachnoid spaces over the convexity of the cerebrum is prevented. Very often the cisterna magna itself is obliterated. In these cases the spinal taps are not dry and phenolsulphonephthalein injected into the ventricle passes out through the foramina in the roof of the fourth ventricle and down into the spinal meninges, but can not reach the cerebral subarachnoid spaces from which nearly all the absorption takes place.

It is to this latter, or communicating group, that the case reported belongs, autopsy disclosing evidence of a tuberculous meningitis that resulted in obliterating adhesions.

CASE REPORT

V. E. K., F. 3c.; age, 20 years. Admitted to the hospital December 23, 1924, as with diagnosis "Undetermined."

Chief complaint.—Blurring of vision, double vision.

Past history.—No bearing, except that when 9 years old he was thrown against a tree and struck his head a hard blow. As a result he was sick for two and one-half months thereafter. No history of convulsions, headaches, bed wetting, or of chronic cough.

Present illness.—Was well until about three months before admission, when he began to have occasional dizzy spells. Two months later he noticed that his vision was blurred and at times double. The eye symptoms have become steadily worse, but there is never any pain.

Physical examination.—A robust, well-nourished, and markedly round-shouldered youth, with exophthalmic eyes. No apparent thyroid enlargement. Pupils somewhat dilated, but equal and reacting to light and in accommodation. Eyeballs protrude and are freely movable in all directions. No nystagmus, von Graefe negative, convergence normal. Vision impaired by blurring and diplopia. Scleræ are hyperemic, particularly near the conjunctival margin.

Nasal examination.—Negative. Patient claimed to have had a discharge from both ears for many years, but examination failed to disclose it or evidence of

perforation of ear-drums. Teeth in poor condition. Tonsils hypertrophied and infected. Tongue protrudes in midline with tremor.

Thorax and abdomen.—No hair on chest. Lungs and heart negative, except that heart rate is somewhat increased. Abdomen negative. No adenopathies; extremities and genitalia normal; tendon reflexes present and not exaggerated. Blood pressure 120/84.

X ray of chest.—Evidence of old tuberculosis process at left apex, with possible cavity formation.

Basal metabolic rate varied between minus 6 and minus 21 per cent. Blood count: 6,080,000 erythrocytes; 14,400 leucocytes; 58 per cent polymorphonuclear. Urine, negative.

Infected teeth and tonsils were removed, but there was no improvement in his condition.

On February 27, 1925, it was noted that amblyopia was increased, that an unsteady, rolling gait had developed, and that there was apparently some decrease in mental alertness. Dizzy spells were increasing in frequency. Spinal puncture showed no increase in pressure. Fluid, clear; 12 cells; globulin, negative. Noguchi negative in all dilutions. Gold curve, 000,000. Blood pressure was difficult to determine and was recorded at 110/90. Tendon reflexes were exaggerated, ankle clonus marked in both feet. Babinski absent, slight general hypesthesia. Romberg, one plus; wide based gait. Blurred vision. Eye grounds show general congestion, with some optic atrophy, without edema.

X-ray examination of the skull at this time showed some abnormality of the sella turcica, but no shadow that would suggest a tumor. All convolutions of the fore brain and left temporal lobe were deeply impressed in the skull, and the bone was thin. The picture was thought to be suggestive of turricephaly, a form of craniostenosis.

By this time papilledema and optic-nerve atrophy were marked and the patient was nearly blind. He suffered occasionally from generalized headaches and was mentally apathetic. A tentative diagnosis of tumor of the brain was made, though the nature of the tumor could not be determined, and careful examination and review of the history failed to disclose any localizing symptoms.

A decompressing operation was advised and accepted. On March 25, three months after admission to hospital, a left subtemporal decompression was performed under ether and a stoma 6.5 centimeters in diameter made in the skull. The brain and dura bulged into the wound immediately, and on opening the dura the brain bulged out under considerable pressure. The brain substance was very friable, and while sponging bleeding points some of it was rubbed off. Clear fluid escaped through a small opening in the mid-posterior part of the wound. Five cubic centimeters was recovered in a test tube and a total of about 20 cubic centimeters was lost. The recov-

ered specimen was found to be cerebrospinal fluid, and cultures were negative.

The immediate postoperative condition was fair, but the symptoms of intracranial pressure progressed. He complained frequently of pain in the occipital region, became stuporous, and optic atrophy was more marked. The meningocele became very large, and it was necessary to aspirate it; at first about once a week; later, daily; 150 to 250 cubic centimeters of clear fluid being drawn off each time. This fluid had a specific gravity of 1,004, and the number of cells ranged from 9 to 12.

On May 22 the cisterna magna was punctured and 5 cubic centimeters of clear fluid withdrawn. It was under 18 millimeters pressure by spinal manometer. At the same time the fluid in the meningocele was under 12 millimeters pressure. Laboratory examination showed the two specimens to be identical. Phenolsulphonephthalein was injected into the meningocele and recovered from the cisterna magna, proving that communication was intact.

By July 1 the patient was totally blind and stuporous. He took nourishment readily, and the general physical condition of his body was good. He was on diuretin, 0.3 gram three times a day, but the amount of cerebrospinal fluid which it was necessary to withdraw steadily increased. From 200 to 300 cubic centimeters on alternate days, about July 1, it increased to 300 to 400 cubic centimeters on alternate days in September.

October 1, 1925, patient was totally blind, wasted away to skin and bone, and lying in one position until moved by the attendant. Extensive bedsores had developed on both heels. Urination and defecation had become practically involuntary. He was fairly alert mentally at times. From 350 to 375 cubic centimeters of fluid were withdrawn from the meningocele every other day. Appetite was fair, urine clear, temperature normal or subnormal.

A month later the cerebrospinal fluid had increased until it was necessary to aspirate 350 to 400 cubic centimeters daily. On December 10, about a year after his admission, he had a chill with rise in temperature to 104°, nausea and vomiting, and severe pain behind the left ear. This was followed by a convulsion, and he became cyanotic, with a rapid, thready pulse.

All symptoms subsided after several days. On December 31 a similar attack developed and lasted for several days. After that time his temperature and pulse were irregular. A month later the temperature became septic in type, ranging between normal and 104°, with a weak, thready pulse of 120 to 140. This was coincident with the development of a bedsore on his back and extension of those on his heels. There was little further change in his condition until his



FIG. 1.—TWO MONTHS BEFORE DEATH; COMPLETELY BLIND



FIG. 2.—THE AMOUNT ASPIRATED DAILY FROM THE HERNIA

364—1

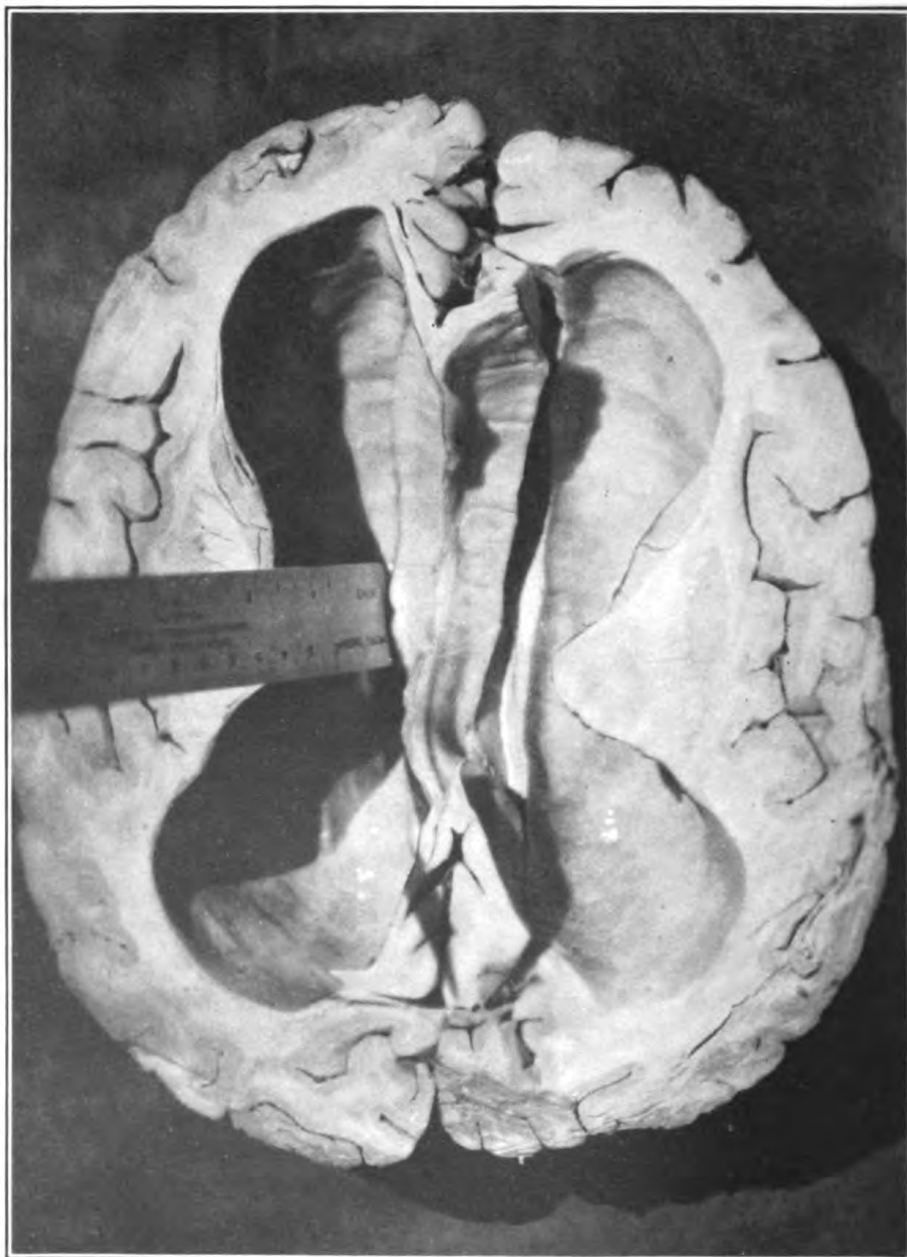


FIG. 3.—SHOWING THE GREAT DISTENTION OF THE LATERAL VENTRICLES

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death on April 25, 1926, about 18 months after the first symptoms developed and 13 months to the day after his decompression operation.

Autopsy findings.—Emaciated body of a young adult male. There is a bulging about the size of half an orange on the left side of the head above and in front of the ear. It is very soft and contains cerebrospinal fluid. Decubitus ulcers over lower part of back. Both feet edematous. Head—Meningocele found to communicate with interior of skull through trephine opening. The skull around opening shows extensive thinning. The whole interior of the skull presents an uneven surface which corresponds with X-ray findings, "digitation." The entire skull is abnormally thin, sella turcica considerably enlarged. The meninges are forced into the foramen magnum a distance of 1 centimeter. The convolutions of the brain are flattened. There are several small white nodules scattered over the surface of the brain. The brain surface, opposite the trephine opening, is eroded to a depth of one-half centimeter. The horn of the lateral ventricle on both sides is distended, measuring 10 by 2 centimeters. The foramen of Sylvius is distended to admit the insertion of an index finger.

Lungs.—Tuberculous abscess the size of an orange in left apex.

Abdomen.—Liver somewhat enlarged, paler than normal. Other organs normal.

Microscopic examination of the meninges at the base of the brain showed them to be thickened and infiltrated with epithelioid cells, the appearance being that of a tuberculous process.

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CARCINOMA OF THE STOMACH WITH LARGE RETROPERITONEAL TUMOR

REPORT OF CASE

By W. H. WHITMORE, Lieutenant Commander, Medical Corps, United States Navy

J. V. G., Sergeant, United States Army, referred by Capt. A. A. McDaniel, Medical Corps, United States Army, was first seen in consultation, December 15, 1925, complaining of a tumor in the epigastrium, and dull pain, extending through the epigastrium to the back.

Family history.—Parents died when patient was very young, cause unknown; no known living relatives.

Past history.—No serious illness at any time. Has always been in good health; no history of venereal disease. Habits, moderate smoker; no history of alcoholism; has engaged in athletics for several years.

Present illness.—Patient felt perfectly well up to November 24, 1925. He played basketball that night, and was unusually short of breath; during the game he felt a sharp pain in the upper abdomen. Since then he has had almost continuous dull aching pain in epigastric region, extending through to back; pain increased by lying on left side, and is worse at night; has required sedatives to obtain sleep. Tumor was first noticed after onset of pain.

•

Patient states that up to onset of illness his appetite had been good, and there had been no digestive disturbances. The company cook volunteered the information that eggs had formed the main item of the patient's diet for several months, although he had not complained of any digestive disturbance. There was no history of vomiting or hemoptysis.

Since onset of illness, there has been obstinate constipation; for the past week the appetite has been poor; otherwise, no gastrointestinal symptoms.

Present weight is 15 or 20 pounds less than a year ago.

Physical examination.—Well-developed, muscular young man; color slightly icteric, but sclerae are clear; mucous membranes paler than normal. Appears to be uncomfortable and apprehensive. Temperature 98.6°; pulse, 80; respiration, 22.

Head and neck: Tongue coated, breath foul; several decayed teeth.

Thorax: Lungs resonant throughout; breath sounds clear and vesicular; no râles.

Heart: Normal size, sounds clear, no murmurs; pulse rate, 80; good volume and regular; blood pressure, systolic 110, diastolic 76.

Abdomen: There is a visible tumor in epigastrium; on palpation, this tumor is found to be a hard, rounded, nodular mass, filling most of the epigastrium, fixed posteriorly, but apparently separate from the liver. Transmitted pulsation from the aorta is felt, but there is no expansile pulsation. Pressure on the mass causes pain. The liver is apparently of normal size and consistency. The veins of the abdominal wall are not enlarged. •

Extremities and reflexes normal. No general adenopathy.

Blood count: Red blood cells, 5,319,000; hæmoglobin, 90 per cent (Tallquist); leucocytes, 8,200; polymorphonuclears, 68 per cent; small lymphocytes, 23 per cent; large lymphocytes, 7 per cent; eosinophiles, 2 per cent.

December 16, 1925: Fluoroscopy, after barium meal; stomach to left of midline, hook-shaped, with large filling defect at middle of lesser curvature; stomach appears to be pushed over by the tumor mass. Active peristalsis; emptying starts immediately. Duodenal cap filled easily, with clear outline. Plates show a large, sharply defined filling defect at middle of lesser curvature of stomach, with slight change in contour on second plate; 24 hours, meal in colon; transverse colon low in pelvis, below tumor mass.

December 19, 1925: Patient admitted to hospital, complaining of severe epigastric pain, obstinate constipation, and loss of appetite. Physical examination shows no change from that above, except that temperature is 99°.

December 20, 1925: Urine, specific gravity, 1.035; faint trace of albumin; few leucocytes and occasional granular cast.

Stools: No ova or parasites found; occult blood test, positive.

Blood chemistry: Nonprotein nitrogen, 26 milligrams; sugar, 65 milligrams.

Blood count: Red blood cells, 4,960,000; hæmoglobin, 90 per cent (Tallquist); leucocytes, 11,200; polymorphonuclears, 79 per cent; small lymphocytes, 16 per cent; large lymphocytes, 5 per cent.

Temperature, 99.2°; pulse, 84 to 100; respiration, 22. Tongue heavily coated; breath has fecal odor. Complains of intense pain; morphine necessary to secure sleep.

December 21, 1925: Intense abdominal pain continues; patient appears very toxic; tongue heavily coated; breath very foul, fecal odor. Abdomen rigid, but not distended. Enema resulted in passage of small amount of mucus. Patient refuses nourishment.

Blood serum shows trace of bilirubin of hemolytic origin. Blood Noguchi, negative.

On account of increasing signs of intestinal obstruction an exploratory laparotomy was advised. Nitrous oxide-oxygen-ether anesthesia. High, right rectus incision. On opening the peritoneum, a large nodular tumor presented, apparently filling the lesser peritoneal cavity. The tumor was firmly fixed posteriorly, and had a dense attachment over a large part of the lesser curvature of the stomach. There were enlarged glands in the gastrohepatic ligament, and multiple hard nodules in the liver. The gall-bladder was apparently normal, no obstruction of common or cystic ducts. It could not be definitely determined if the large tumor originated in the stomach, pancreas, or retroperitoneal space; tentative diagnosis, carcinoma of pancreas, with invasion of stomach, and metastasis to liver.

The small intestine was not dilated, and there was no apparent obstruction. In the mesentery of the small intestine there were enlarged glands or metastatic nodules; in the mesentery of the ilium there were two dark congested areas, apparently due to venous obstruction.

A small wedge of the right lobe of the liver, containing a nodule, was excised, and liver wound closed with mattress sutures. Abdominal wound closed in usual manner.

Patient was in poor condition at close of operation. Intravenous infusion of 400 cubic centimeters of 25 per cent glucose was given during operation.

December 22, 1925: Patient did not react well from anesthesia and there has been little response to antishock measures. Patient is semiconscious; temperature, 101; pulse, 130-140; respiration, 28 to 40.

December 23, 1925: Patient unconscious; 8 a. m. temperature, 101.8°; pulse, 140; respiration, 32. Blood pressure, systolic 60, diastolic 40. Adrenalin, 1-1,000, 15 minims intravenously, given without any effect. There are numerous bubbling râles at base of lungs. Intermittent Cheyne-Stokes respiration; breath has foul, urinous odor.

12 noon temperature, 104° (axillary); pulse, 160; respiration, 35.

1.15 p. m. temperature, 105.8° (axillary), pulse not perceptible at wrist. Heart sounds indistinct.

2.30 p. m. temperature 106.8° (axillary).

2.45 p. m. patient died.

Postmortem examination.—Adult white male of slight build, but not definitely emaciated. Height, 66 inches; weight, 125 pounds. Sutured operative wound in upper right abdomen; firmly closed; shows no signs of infection.

Abdomen: Peritoneum normal. Stomach slightly distended. On lesser curvature there is a flat tumor area about 5 centimeters in diameter. This tumor area is continuous with a large extragastric tumor.

Intestines moderately congested but not distended; there is an occasional hemorrhagic area, caused apparently by interference with blood supply.

Liver contains numerous white nodules, from 1 to 3 centimeters in diameter; upon cutting through one, considerable gritty resistance is encountered. A small sutured operative wound on lower edge of right lobe shows no evidence of hemorrhage. Gall bladder is somewhat distended; wall normal; no stones present. Pancreas normal.

Stomach: On lesser curvature there is a flat tumor area about 5 centimeters in diameter continuous with the extragastric tumor. No signs of hemorrhage. Stomach otherwise normal.

Spleen shows acute congestion. **Kidneys**, apparently normal.

There is a large retroperitoneal tumor, about 15 by 7 by 3 centimeters. It is tightly adherent to the surrounding structures. The upper end is roughly globular, about 7 centimeters in diameter, and is attached by a small prolongation to the lesser curvature of the stomach; the tumor extends downward, surrounding the aorta, and along the first part of the common iliac arteries; it invades the mesentery in several areas; the neighboring lymph glands in the gastrohepatic omentum and in retroperitoneal space show invasion. The tumor separates from the prevertebral fascia with difficulty: it is white in color, of firm consistency, and on section there is gritty resistance.

Chest: Old adhesions, laterally and posteriorly, over upper left lobe; some adhesions to diaphragm at left base. Pleural fluid, normal in amount and character. Both lungs edematous and show marked hypostatic congestion; hypostatic pneumonia present in left lower lobe.

Heart: In systole and rather small; muscle normal; mitral valve, aortic valve, and aorta show atheromatous plaques.

Postmortem diagnosis: Retroperitoneal sarcoma with metastasis to liver and invasion of stomach. Hypostatic pneumonia base of left lung.

Pathological reports.—Sections of the tumor and metastatic nodules were studied at the Naval Medical School by Lieut. Commander John Harper, Medical Corps, United States Navy, who reported:

Diagnosis: Adenocarcinoma. Examination shows neoplastic process to be an adenocarcinoma. Liver nodules undoubtedly metastatic from point of origin in either pylorus of stomach or pancreas.

A later report from Doctor Harper states:

Restudy of all tissues received still further convinces us that the neoplastic process is that of an adenocarcinoma, and undoubtedly had point of origin in stomach.

The gross specimen was sent to the Army Medical Museum, and Maj. George R. Callender, Medical Corps, United States Army, made the following report:

Accession No. 24117. Specimen mounted. Consists of portion of the stomach with a craterlike ulceration of the lesser curvature. This is continuous with an irregular lobulated more or less necrotic mass of dense tissue showing irregular hemorrhages throughout.

Histological examination: The tumor consists of irregular alveoli of cells surrounding the rapidly growing portion of a minimum of stroma. In other portions there is more or less connective tissue apparently replacing necrotic tumor. Large areas of the tumor are completely necrotic and represented by detritus and the remnants of nuclei of leucocytes. Cells are irregular in shape, sometimes appearing almost columnar, with large nuclei which are rather pale in the active cells. Occasionally hyperchromatism is seen and there are moderately numerous mitoses.

Congestion and parenchymatous degeneration of the liver with pressure and atrophy in the vicinity of the tumor.

Diagnosis: Medullary type adenocarcinoma of the stomach, probably arising in the peptic glands.

Sections of the tumor and liver were sent to Dr. Joseph C. Bloodgood, who gave the following opinion:

Practically all multiple tumors of the liver are carcinoma and usually metastatic. The sections show a malignant tumor. There are certain types of epithelial tumors called the transitional type in which the cells are not basal nor spiral as in skin, nor glandular, and these transitional cuboidal cells (cuboidal cancer) are very difficult to differentiate from malignant pigmented mole or some type of sarcoma.

The specimen of liver that you sent me is undoubtedly a gross metastatic tumor.

I am inclined to think from the pathology only that we are dealing with a metastatic carcinoma. Yet, when we come to read the history, there was a retroperitoneal tumor with nodules in the liver and other glands in the gastrohepatic omentum. From your description of the tumor, it could be one of those rare forms of cancer in which the tumor infiltrates the wall and produces huge retroperitoneal masses. I have a few such cases. Most of the retroperitoneal tumors are distinctly of the sarcoma type.

Your autopsy presents a retroperitoneal mass attached to the stomach. It also speaks of a tumor area in the stomach, so it could be metastasis to liver, with primary in the stomach.

COMMENT

Carcinoma developed in a young man, aged 27 years; the origin was apparently in the stomach, and the tumor extended through the stomach wall and formed a huge mass in the retroperitoneal space, continuous with the tumor area of the stomach. There were multiple metastases to the liver, gastrohepatic omentum, retroperitoneal glands, and mesentery. In spite of the huge size of the tumor there were no growth symptoms, and the tumor was not noticed until one month before death; and there was no anemia. It is impossible to determine the length of time this tumor had existed, but it certainly was not of recent origin, as there were large necrotic areas with considerable fibrosis.

HEXAMETHYLENAMINE IN MENINGEAL INFECTIONS

By A. E. BRUNSCHWIG, Lieutenant (Junior Grade), Medical Corps, United States Navy

Crowe (1), in 1909, published results of experiments conducted upon one patient and numerous rabbits and dogs showing that hexamethylenamine when given in sufficient doses, by mouth, is excreted into the cerebrospinal fluid where it appears "to exercise a decided inhibitory effect on the growth of organisms inoculated into this fluid after its removal from the body." Guest and Fairley (2) administered hexamethylenamine, not only by mouth but also intrathecally, in doses as high as 60 grains, in 20 cases of cerebrospinal fever without beneficial results.

The antiseptic powers of hexamethylenamine depend upon its dissociation with liberation of free formaldehyde. This dissociation occurs only in acid solution. Alkaline solutions of hexamethylenamine possess no antiseptic qualities (3). Since the cerebrospinal fluid is practically always alkaline, hexamethylenamine secreted or injected into it should not confer any antiseptic powers. Crowe's positive results, however, are worthy of reconsideration; for, if he be correct, the administration of hexamethylenamine will certainly be indicated as a prophylactic or therapeutic measure for cerebrospinal fever and other infectious processes involving the meninges and central nervous system.

EXPERIMENTAL

For confirmation of Crowe's results it was planned to administer hexamethylenamine by mouth to three patients; in due time obtain samples of cerebrospinal fluid by lumbar puncture; test these for the drug and for free formaldehyde, and observe the rapidity and amount of growth of a strain of bacteria inoculated into each sample as compared with similar observations in a control.

The patients were obtained from the genitourinary service of the United States Naval Hospital, Washington, D. C. They had undergone antiluetic treatment, but at the time of performance of this experiment exhibited negative Kahn tests. Two cubic centimeters of each sample of cerebrospinal fluid obtained under aseptic conditions were preserved for inoculation with one loop of a 24-hour broth culture of *Streptococcus viridans*; the remaining portions of the fluids were used for the chemical tests.

Hehner's test (4), used also by Crowe, was employed for the detection of hexamethylenamine. This test is performed by adding a drop of milk to a small quantity of cerebrospinal fluid and statifying this mixture over concentrated sulphuric acid (99 per cent) which contains a trace of ferric chloride. If hexamethylenamine be present a deep amethyst color develops at the juncture of the layers. This color must be seen to develop immediately or within a few seconds in order that the test may be called positive, for it may develop in time if the fluids are left standing, even though there be no hexamethylenamine present.

Lebbin's test (5) was employed for the detection of free formaldehyde. This test has the advantage of being executed in strongly alkaline medium, thus preventing any decomposition of hexamethylenamine that may be present. Lebbin states that this test is capable of detecting free formaldehyde in dilutions of 1 part in 10,000,000. In connection with this experiment it was found to be definitely positive when tried with a dilution of 1 part free formaldehyde in 50,000 parts of distilled water. The test is performed by boiling about 5 cubic centimeters of a 50 per cent solution of sodium hy-

droxide to which 0.06 gram of resorcin has been added, with an equal amount of the fluid to be tested. A violet color develops if free formaldehyde be present.

Following is a tabulation of the results obtained:

Patient.....	1	2	3	4 (control)
Hexamethylenamine administered.....	{ 20 grains three times a day for two days prior to the experiment and 20 grains two hours before lumbar puncture. }			None.
Chemical tests upon cerebrospinal fluids:				
(a) for hexamethylenamine.....	+++	+++	+++	—
(b) for free formaldehyde.....	—	—	—	—
Turbidity of cerebrospinal fluid after incubation for 24 hours at 38° C. following inoculation with 1 loop of a 24-hour broth culture of <i>Strep. viridans</i>	+++	+++	+++	+++
Colonies on blood agar plates after streaking one loop of above fluid and incubation for 24 hours at 38° C.....	+++	+++	+++	+++

DISCUSSION

It is shown again that hexamethylenamine, when administered by mouth in sufficient doses, readily passes into the cerebrospinal fluid. But here free formaldehyde is not liberated, nor does the drug exert antiseptic powers.

Although the results of these experiments are negative, they are deemed worthy of report for the following reasons: First, the work of Crowe was not confirmed; second, hexamethylenamine has often been administered, at the suggestion of such authorities as Osler (6), in hopes of preventing or benefiting infections of the meninges.

In conclusion, mention may be made of helmintol (hexamethylene-tetramine anhydromethylene citrate), which liberates formaldehyde in alkaline as well as acid media. Fairley (8), experimenting *in vitro*, found that this drug exerted inhibitory effects on the growth of meningococci, but the concentration necessary was far greater than could possibly be obtained *in vivo*. The drug was tried in about 30 cases of cerebrospinal fever, administered intravenously in doses as high as 60 grains. In none of these cases, however, was it possible to demonstrate free formaldehyde in the cerebrospinal fluid.

(Appreciation is expressed for the aid of Lieut. Commander G. L. White (M. C.), United States Navy, from whose service the samples of cerebrospinal fluid were obtained.)

REFERENCES

- (1) Crowe, S. J.: Johns Hopkins Hospital Bull., 20; 102 (1909).
- (2) Guest and Fairley: Australian Med. J., 388, October (1915).
- (3) Fairley: Ibid.
- (4) See above article by Crowe.
- (5) Allen: Commercial Organic Analysis, vol. 1, Blakiston, Son & Co., Philadelphia, 1898.

(6) Osler: The Principles and Practice of Medicine, ninth edition, Appleton & Co., New York, 1923.

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REINFECTION IN SYPHILIS

REPORT OF AN UNUSUAL CASE

By C. P. ARCHAMBEAULT, Lieutenant, Medical Corps, United States Navy

Although syphilis has been recognized and treated for centuries in a way that must increase our respect for the older syphilologists, when we consider that they had no laboratory check, the recognition of the fact that reinfections in syphilis occasionally occur was not made until quite recently. Most syphilographers doubted the possibility of a syphilitic reinfection until the introduction of modern methods of diagnosis and the great change and improvement in treatment brought to light several cases which could be explained in no other way.

Numerous cases of reinfection have been reported by Reasoner,¹ Driver,² White,³ Schweitzer,⁴ Brenn,⁵ Williams,⁶ Schamberg,⁷ Bechet,⁸ Parounagian,⁹ and others. Reasoner gives the case history of 6 patients, 4 of which he considers true reinfections and 2 probable reinfections. Driver reports 13 cases of reinfection in approximately 5,000 syphilitic patients, and White in 1,500 syphilitic patients treated during the World War at a British base hospital saw 28 cases of reinfection.

In Driver's series there is one case of extragenital reinfection in a physician who was probably exposed in the course of his practice. The first lesion developed at the inner canthus of the left eye, the second at the base of the left index finger on the dorsal surface.

Although reinfection does occur, these statistics seem to show that the condition is rare enough to be of interest.

The conditions considered necessary for a diagnosis of reinfection by most authorities are:

1. In the first attack a clinical picture of syphilis, checked by positive laboratory findings (Wassermann, and dark field demonstration of the *Treponema pallidum*).

2. An interval between first and second infections, with treatment adequate for a cure.

¹ Reasoner, M. A.: Amer. J. Syph. (Apr.), 1924, p. 313.

² Driver, J. R.: J. A. M. A. (Nov. 29), 1924, p. 1728.

³ White, C. F.: Brit. M. J. (Oct. 20), 1917, p. 509.

⁴ Schweitzer, S. E.: J. A. M. A. (Apr. 15), 1916, p. 1196.

⁵ Brenn, C. E.: Mil. Surg. (Sept.), 1922, p. 250.

⁶ Williams, C. M.: Arch. Dermat. & Syph. (June), 1920, p. 702.

⁷ Schamberg, J. F.: J. A. M. A. (Sept. 13), 1919, p. 826.

⁸ Bechet: J. Cutan. Dis., 1919, 4: 230.

⁹ Parounagian, M. B.: N. Y. M. J. (Jan. 22), 1916, p. 173.

3. In the second attack, a clinical picture of syphilis, with the findings of *Treponema pallidum* in the lesion.

4. A series of negative Wassermann tests in the interval between infections, or one or more negative Wassermann reactions at the time of second infection.

REPORT OF CASE

X. X., baker, first class, United States Navy, born in 1895, first enlisted in 1907.

First infection.—Early in December, 1924, the patient was transferred to the United States naval hospital at Canacao, P. I., with a diagnosis of tonsillitis. At the hospital he was found to have secondary syphilitic lesions on the left border of the tongue and on the hard palate. Adenopathy was not general. There was no history of venereal disease, and no scars were found on the genital region. The patient had been on duty with a man who was later discovered to have been concealing a syphilitic infection. The diagnosis was changed from tonsillitis to syphilis, in line of duty and not due to his own misconduct. On December 17, 1924, a Wassermann reaction was strongly positive and *Treponemata pallida* were found in the lesions in his mouth. From December, 1924, to August, 1925, he received 20 injections of neoarsphenamine and 22 injections of mercury. The lesions in the mouth cleared up after the second injection. (This history of the first infection was obtained from the patient's health record.)

Second infection.—On September 22, 1926, after being on recruiting duty for about six months, the patient reported to the writer, complaining of a small excoriation, which had been present for about three days, on the mucous surface inside the right cheek. This lesion was not typical, but, because of the previous history, the patient was sent to the naval hospital at Brooklyn for a laboratory examination. The dark field was negative for *Treponema pallidum* and the Wassermann reaction was negative, but the Kahn test was one plus on September 24. A typical chancre appeared on the left side of the lower lip at the mucocutaneous border on October 3, 1926, and at this time the lesion inside the mouth was also quite typical. On October 6 *Treponemata pallida* were found in both lesions, and the following day the patient was transferred to the naval hospital at Brooklyn, N. Y. The Wassermann reaction was still negative on October 15, but the Kahn test was two plus. At the present time the lesions have almost entirely disappeared, the man having received two injections of neoarsphenamine.

As there was no evidence of a primary lesion on the genitals and as there was no suspicion of perversion, this case was diagnosed as syphilis, in line of duty and not due to his own misconduct. As the man had been eating in various cheap restaurants, it is believed that this may have been the source of infection.

SUMMARY

1. It is believed that in this case the history quite closely satisfies the conditions necessary for a diagnosis of syphilitic reinfection.
2. The first infection was probably extragenital.
3. The second was known to be extragenital.
4. Both infections were believed to have been innocently acquired.
5. There were two primary lesions in the second infection.

CONCLUSION

As this man, on active duty aboard ship and at a recruiting station, was in no way brought in contact with possible sources of syphilitic infection by his duties, and as he was twice nonvenereally infected with syphilis, it is believed that this case is of interest because of these unusual features.

AN UNUSUAL BULLET WOUND

By P. H. GOLDBERG, Lieutenant (Junior Grade), Medical Corps, United States Navy

Dr. John Chalmers Da Costa lectures on numerous incidents of the eccentricities of small-bore high-powered bullets, but the following case appears eligible for addition to the oddities:

The U. S. S. *Palos* was awaiting orders in Ichang, Hupeh, China. Gen. Chiang Kai Shek's Cantonese Reds and Gen. Yang Sen's Szechuenese troops were fighting 70 miles below Ichang, near Shasi at Kungan, China, on the Yangtze River. Wounded soldiers were being brought to the Rankine Memorial Hospital at Ichang. Their wounds were all infected and nearly all were still untreated, although some were almost three weeks old. At the end of the clinic line of out-patients, a tall Chinese sergeant was standing. Through Dr. Andrew Graham, head of the hospital, who interpreted, the following history was obtained:

Sergt. Sen Teh Yuen, of Szechuen Province, aged 36, was standing and directing his men where to fire when he was hit in the upper jaw by a bullet. He lost consciousness for two or three minutes and when he arose heard his men calling for a medical officer. Sometime later a medical officer came and put an iodine pack over a small hole, about $\frac{3}{4}$ inch in diameter, in his left shoulder. The patient expectorated a little blood for about 30 minutes. This was the only treatment for three days. At the end of three days he was given a mouth wash and on the fifth day reported to the Ichang Memorial Hospital with a detail of wounded. The sergeant "appreciated his good fortune of being able to get out of the war without being hurt."

The details are as follows:

Wounded by a high-velocity steel-jacket rifle bullet, range 400 yards. Bullet entered grazing upper lip. Both central incisors and right upper canine broken off at gum border. Tongue slightly lacerated in median line for a distance of $\frac{1}{2}$ inch. Bullet passed through posterior pharyngeal wall just to the left of median line and had its exit 1 inch to the left of the sixth cervical vertebra.

The entrance of the bullet was about $\frac{1}{2}$ inch in diameter. The exit was about $\frac{3}{4}$ inch in diameter. There is no remaining inconvenience and, except for the loss of three teeth, this patient has no defects in speech, mastication, or sensation.



FIG. 1.—SHOWING LOSS OF TEETH
AND INJURY TO TONGUE CAUSED
BY ENTRANCE OF BULLET

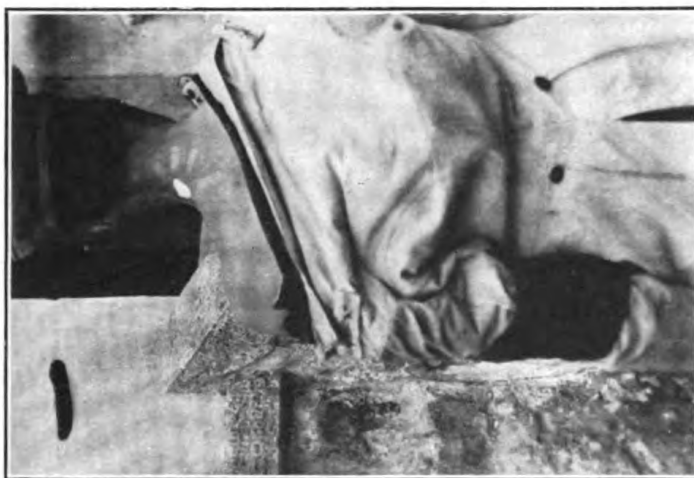


FIG. 2.—WOUND OF EXIT



FIG. 3.—SHOWING ABSENCE OF
DEFORMITY RESULTING FROM
INJURY



THE NAVAL RESERVE

MISSION

The mission of the Naval Reserve is to procure, organize, and train the officers and men necessary in the event of war for the expansion and operation of the United States Fleet and Naval Transportation Service.

The Naval Reserve is created and established under the provisions of the act approved February 28, 1925, effective July 1, 1925, as a component part of the United States Navy. It consists of three classes, designated as follows:

F, the Fleet Naval Reserve, whose mission is to create and mobilize trained organizations for service on board vessels of the United States Fleet and Naval Transportation Service in the theater of operations.

M, the Merchant Marine Naval Reserve, whose mission is to create and train organizations on board seagoing vessels of the merchant marine for service on board their own vessels when commissioned by the Navy in the event of war.

V, the Volunteer Naval Reserve, whose mission is to provide additional personnel for general service, usually in the United States Fleet and Naval Transportation Service, and other personnel for special service, usually on shore, as required by the war organization.

GENERAL POLICIES

The Office of Naval Operations is charged with the initiation and formulation of the department's policies relating to the size, organization, administration, training, and mobilization of the Naval Reserve, and with the coordination of the resultant duties imposed upon the various offices and bureaus of the Navy Department.

The commandants of the several naval districts, under the supervision of the various bureaus and offices concerned, are charged with the procurement, administration, training, and readiness for war of the Naval Reserve under their jurisdiction.

The Bureau of Medicine and Surgery has been working out estimates of the total number of medical men needed in case of emergency for the various duties and specialties. In gathering information as to the needs in the several districts the district medical officers had to be depended on. Where the cooperation of a large number of individuals is necessary, progress is necessarily slow.

In addition to enrollment of individual officers in the Naval Medical Reserve, the bureau plans to enroll groups of specialists for duty as units. Such units will be assigned to station hospitals, base hospitals, and hospital ships in such a way that men who are accustomed to working together will continue to do so, after being called to active duty, in case of war.

PROMOTIONS

The Bureau of Medicine and Surgery is much interested in the promotion of medical officers of the Naval Reserve. For that reason it urges medical officers of the reserve to qualify for promotion. In time of war promotions will be rapid, and those who see to it that they are prepared in time of peace will have no difficulty with examinations for promotion, if the occasion arises. In time of peace those in the rank of lieutenant (junior grade) and lieutenant are eligible for promotion when certain requirements are satisfied.

In the case of officers of the Fleet Naval Reserve, four years are required in each rank, together with 60 days' active or training duty in the grade in which serving.

In the case of officers of the Volunteer Naval Reserve, the general-service officers will be eligible for promotion to the next higher rank, but not above lieutenant commander, when they have completed six periods of training duty in their present rank of at least 15 days each. Credit will not be given for more than one training period in any one fiscal year. The special-service officers will be eligible for promotion to the next higher rank only when in their professional attainments they have made such marked advance as would justify a commission in the higher rank if they were being appointed in the reserve for the first time.

Since Volunteer Naval Reserve officers are not required by law to perform any training, they must request training duty if they desire promotion and are to satisfy the above requirements. One usually takes a vacation for the purpose of a change of environment and a change of interests. An officer of the Volunteer Naval Reserve can combine his vacation with training duty and so accomplish two pleasant things at the same time. Unfortunately, appropriation for the training of the Naval Reserve is very limited and is used principally for the members of the Fleet Reserve. There is a small percentage, however, assigned for training members of the Volunteer Reserve, part of which can be used for medical officers recommended by the Bureau of Medicine and Surgery to a large naval hospital for an intensive period of training not to exceed 15 days.

The scope of the professional examination for promotion of medical officers in the Naval Reserve will include questions appropriate for the grade examined for in the following subjects, but special attention will be given to the duties required of the individual officers in time of war:

(1) *General instructions—*

Navy Regulations.

Bureau manuals.

General orders.

Duties of commanding officer.

Duties of executive officer.

Duties of heads of departments.

Duties of officer of the deck.

Duties of division officer.

Duties of junior division officer.

Emergency drills.

Official correspondence.

Writing up log.

Honors.

Routing.

Military laws.

(2) *Practice of medicine and surgery and general hygiene.*—One or more theses upon subjects to be selected by the naval examining board.

TRAINING

The Bureau of Medicine and Surgery has been much concerned with training medical officers in the Naval Reserve. Within recent years some of the graduates of class A schools have had a year of intensive training while serving an internship in one of the naval hospitals as members of the regular Navy. After resignation from the regular service these men almost invariably accept a commission in the Naval Reserve.

In case of other officers of the Naval Reserve a correspondence course was conducted by the Naval Medical School. This, in the opinion of those members of the faculty who were directly concerned with the course, proved unsatisfactory. The medical man in civil life is subjected to irregular demands on his time. When a breathing spell occurs, he is in no mood to study; but wishes to relax or enjoy some form of amusement. The correspondence course has been abandoned as unsuitable.

In the future each medical officer in the Naval Reserve will be supplied with a copy of the Manual for the Medical Department of the Navy. The Manual will not only prove very interesting in showing glimpses of life in the regular Navy, but will be quite instructive in matters of administrative and executive value. Many suggestions will come to the mind of the reader, applicable to needs in civil life. The character of the Manual is such that it can be picked up at any time, for as long or as short a period of time as desired and always put away with a feeling that one has profited from it.

The NAVAL MEDICAL BULLETIN will continue to be sent to each medical officer of the Naval Reserve, so that all may keep in touch with the regular service.

ADVANTAGES

In case of a national emergency the medical officer in the Naval Reserve has a marked advantage over his colleagues in civil life. His place in the organization is determined, he has acquired knowledge which makes him not only useful within that organization but assures him freedom from dependence on some one else at every step. He knows that he does not have to begin at the bottom of the ladder. All these advantages he acquires at the expense of a little personal application at times most convenient to himself. Whether or not he wishes to take voluntary training is entirely for him to decide. Promotion to the next higher rank is his incentive, but he alone decides when he wants to qualify and be promoted.

Officers who have been appointed in the Medical Corps, United States Naval Reserve, since July 1, 1926

Name	Rank	Class	Date appointed
Solland, Albert.....	Lieut. commander.....	Vol. (S).....	Nov. 15, 1926
Becker, John B.....	Lieut.....	Vol. (G).....	Aug. 3, 1926
Coleman, Herbert R.....	Lieut.....	Vol. (G).....	Sept. 22, 1926
Carey, Charles K.....	Lieut.....	Vol. (G).....	Oct. 30, 1926
Leahy, William R.....	Lieut.....	Vol. (S).....	Sept. 21, 1926
Elliott, William C.....	Lieut. (j. g.).....	Vol. (G).....	Aug. 20, 1926
Collins, Charles J.....	Lieut. (j. g.).....	Vol. (G).....	Sept. 11, 1926
Cooke, Harry H.....	Lieut. (j. g.).....	Vol. (G).....	Do.
Davies, Drew L.....	Lieut. (j. g.).....	Vol. (G).....	Sept. 17, 1926
Brown, Byron F.....	Lieut. (j. g.).....	Vol. (G).....	Do.
Hager, Benjamin H.....	Lieut. commander.....	Vol. (S).....	Jan. 19, 1927

LIEUTENANTS PROMOTED TO LIEUTENANT COMMANDERS SINCE JULY 1, 1926

Lingenfelter, George P.....		Vol. (G).....	Jan. 4, 1927
Saverin, Arnold E.....		Vol. (G).....	Sept. 23, 1926
Stott, Ardenne A.....		Vol. (G).....	Sept. 30, 1926
Young, Frank L.....		Vol. (G).....	Sept. 27, 1926
Skillem, Penn G.....		Vol. (G).....	July 1, 1926
Clements, James D.....		Vol. (G).....	Nov. 19, 1926
Clark, Vernon G.....		Vol. (G).....	Sept. 1, 1926
MacIsaac, John A.....		Vol. (G).....	Oct. 27, 1926

COMMISSIONS FOR APPOINTMENTS SENT OUT BUT EXECUTED OATHS AND ACCEPTANCES OF OFFICE NOT YET RECEIVED

Agnew, John R.....	Lieut. (j. g.).....	Vol. (G).....	
Bender, Morris S.....	Lieut.....	Vol. (G).....	
Cheney, Clan J.....	Lieut.....	Vol. (G).....	
Clements, Albert F.....	Lieut. (j. g.).....	Vol. (G).....	
Levin, Israel.....	Lieut. (j. g.).....	Vol. (G).....	
Spillman, Ramsay.....	Lieut. (j. g.).....	Vol. (G).....	

COMMISSION FOR PROMOTION SENT OUT BUT EXECUTED OATH AND ACCEPTANCE OF OFFICE NOT YET RECEIVED

Robert B. Sweet.....	Lieut. (Vol. G).....	Lieut. commander Vol. (G).....	
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NURSE CORPS

Many times the Navy nurses in their duties have experiences somewhat out of the ordinary. The nurses at Pensacola had rather an exciting and interesting time during the recent hurricane, and the different ones have written of their experiences in a very entertaining manner.

Another nurse tells of her experience in helping out with an epidemic at a station where no Navy nurses are on duty.

THE PENSACOLA HURRICANE

By MARY J. McCLOUD, Chief Nurse, United States Navy

Several times during the hot September days, when the waves of Pensacola Bay were turbulent and the storm clouds were piled up in the sky and the "pesky dog flies" and mosquitoes were biting and stinging like wasps, people remarked, "This is hurricane weather," and at last their prognostication came true.

On September 19, the gale struck us in all its fury. All that day the noise of the Gulf breaking on the beach of Santa Rosa Island, where Fort Pickens is situated, was like thunder. One could see mountains of surf coming over the breakwater of Fort McCrea and submerging the S. S. *Massachusetts* that had been near by. The wind was blowing strongly and the barometer falling.

The radio notified us of the destruction of Miami and other cities on the east coast of Florida, and said the hurricane was coming in a northwesterly direction and would probably strike Pensacola at 2 o'clock in the morning of Monday, the 20th, if the wind did not verge in another direction. Of course, we hoped for the best and kept on with our usual duties.

The sunset at 5 o'clock was ominous. When the sun sank below the horizon darkness settled down immediately. The meteorologist at Pensacola kept notifying the public by radio every hour of the approach of the storm. Jacksonville and New Orleans called WCOA, Pensacola answering, every hour until 2 o'clock a. m. Monday, when all electrical wires were blown down, bridges swept away, and we were cut off from the outside world. Then the news was broadcast from New Orleans that Pensacola was destroyed, blown off the map.

As we had the radio installed in our quarters, both loud speaker and the individual phones, we listened in until 2 a. m., awaiting whatever fate had in store for us—a most uncanny feeling. Nevertheless, in spite of our uneasiness we fell asleep after 2 and did not awaken until the usual hour. At this time the velocity of the wind was 120 miles an hour, the rain was coming down in torrents, trees swaying and twisting and branches flying in all directions. Many immense live-oak trees were being uprooted, the windows smashing, roofs leaking, and altogether it was terrifying.

Our mess hall being in another building, we wondered how we would reach there safely in order to get food, when the commanding officer came to us with a pitcher of coffee and a bottle of cream, saying, "Take this; don't go out now." He was dressed in dungarees and was drenched; he had been up all night watching the hospital. As the civilian employees, cooks, maids, etc., who lived in Pensacola and Warrington, did not appear on duty, the commanding officer called the hospital corpsmen to prepare breakfast. The water main was broken, no water available, no steam, and no electricity. The coffee was made with rain water. No one criticized the taste; all were thankful.

The rain was beating through the windows and under the doors into our house, and flowing down the corridor and into the rooms like a river current. The more we tried to sweep it out the faster it would come in. The house vibrated and we expected to see the gallery torn off at any moment.

The waves of the Gulf were dashing over Barancas Dock, sweeping everything before them. Where there were once storehouses and a dwelling house, now nothing could be seen, all having been washed out to sea. The bathing beach was cleaned of bathhouses and rafts by the tidal wave, which dashed its spray to a height of 15 feet over the seawall, deluging the navy yard, the aviation station, and Warrington to a depth of 5 feet. The people in Warrington, a village situated between the hospital reservation and the navy yard, were warned to move out of their homes as quickly as possible and seek refuge in the hospital.

The hospital reservation is on two levels. One enters the gate at sea level, ascends 32 steps to reach a plateau on which the wards and quarters are built in pavilion style, the wards being connected by a covered runway. Many large live-oak trees adorn the grounds, and the reservation is surrounded by a brick wall 12 feet high. Being on an elevation, we did not fear the rising water.

At 9 a. m. Monday, the 20th, men, women with infants in arms, old women, children leading dogs, carrying bird cages and parrots, all

came struggling against the wind and wading through water 4 feet deep in through the hospital gate. Then we got busy. Unoccupied wards were opened, beds made up, pajamas and warm blankets provided, nice hot soup administered to the chilled unfortunates, who numbered 400. Everyone was made comfortable, the ailing ones received medical attention, food was supplied for the infants and children, and the nurses supplied clothing from their own wardrobes to many of the drenched women. Our quota of nurses numbered but 5, so one can imagine how busy we were for 3 or 4 days. Everyone worked hard. The hospital corpsmen, under the guidance of the chief pharmacist, assisted by a sailor from the navy yard bakery, prepared the meals, consisting of excellent soup, canned vegetables, biscuits, coffee, tea, and canned cream, which was served cafeteria style to those who were able to go to the mess hall and carried to the bed patients on trays. They were all so grateful, and some were loath to leave us at the end of the week, as they were so dry and comfortable, their homes being soaked by rain and flood. The children had a wonderful time. In writing compositions at school about their experiences at the hospital they said, "We all had pajamas and had lots of good things to eat."

Our commanding officer, ever thoughtful of everybody, sent an ambulance to the aviation station for the Red Cross field director and the Navy relief nurse, but as they had a sick woman in their house they decided to remain there. As their house was a brick building, no doubt they considered it much safer than our wooden pavilion. All day and night Monday the storm raged. Tuesday the men refugees started out to view their wrecked homes and the devastated hangars and planes at the station. All bridges and electrical wires were destroyed, so we were isolated. Some of the officers who lived in Pensacola rode in autos to the Little Bayou and walked the remainder of the way, a distance of 5 miles. Wednesday the Army tugboat commenced plying twice daily from Pensacola to the navy yard, enabling the employees to go to work. No mail or telegrams reached us until Friday. Naturally our folks at home were frantic about our welfare, and telegrams sent by them did not reach us for four days.

With all the wreckage in Pensacola, everyone miraculously escaped injury. On Tuesday the sun shone brightly and everyone was cheerful. Then the work began of clearing up the debris on the grounds. In a few days, owing to the remarkable executive ability and indefatigable activity of our commanding officer, everything became normal again.

MY FIRST EXPERIENCE IN A HURRICANE

By LUAMA A. MACFARLAND, Reserve Nurse, United States Navy

On Sunday, September 19, 1926, after 50 days of a perfect vacation, the Dixie Flyer dropped me in Jacksonville, Fla., and from there I entrained for Pensacola. It was in Jacksonville that I learned a hurricane was threatening Florida, but those reports told that only the east coast would be visited, so naturally I was glad that Pensacola is almost as far west as one can go and remain in the State of Florida. Therefore, in my ignorance of the nature of hurricanes in general, and misled by incorrect reports of this one storm in particular, I started forth for the "Deep Water City," secure in my fool's paradise with the thought that I was escaping the big blow. We had almost reached Pensacola, in fact we were but a few miles away, when the conductor of the train told me that possibly the train could not get into the city owing to the fact that the storm and flood probably had already washed out the long bridge across Escambia Bay. Upon questioning him I learned that just a few miles from my destination we were directly in the path of the storm, which was one of the worst ever known to have visited Florida. I did not have much time to grow uneasy. The train crept slowly ahead, and soon I was in Pensacola. Had I arrived a few hours later I would have been marooned in Pensacola several days, as the bridges connecting the city and the naval air station were destroyed by the storm, also the telegraph and telephone wires were down; therefore I would have been counted "A. W. O. L."

So far as I could tell, there was no occasion for alarm. The wind was strong, but certainly not fierce. The air station with its hospital being 9 miles from Pensacola, a taxi was the only means of transportation. I had some difficulty in locating a cab, but succeeded, and in about 30 minutes I ended the seemingly long and dreary day. With the security of the nurses' home well around me and the comfort of a hot shower, there was one fitting place to end a tiresome day—bed. Some time during my unbroken slumber the storm broke—about 3 a. m. Monday, September 20, I have since learned.

In the early morning, having become dimly conscious of a raging wind and heavy rain, I dressed in my uniform and saw that the sky was ominously dark. Clouds were low, flying, in fact, over the Pensacola Bay. One couldn't tell whether the clouds came down to the water or the spray, lashed by the ferocious wind, reached up to the sky. The trees were twisting and bending to the fury of the terrific gale, giving up their leaves, twigs, and occasionally, with a protesting roar, their limbs. The air was filled with débris of all sorts—grass, paper, sticks, roofing, and everything. The wind seemed to be able to lift and tear whatever it could get under, and was roaring in its work. Every crash, and there were many, told of

tree, window, or building unable to stand against the fury. Between 9 and 11 o'clock Monday morning the wind reached its highest velocity, about 120 miles an hour (a wind of 100 miles an hour exerts a pressure of 50 pounds to each square foot of exposed surface), and at this time the aerological observatory at the station was partially wrecked. This left us without any records excepting atmospheric pressure, and at this time the bay was 15 feet above its normal level. With the exception of the hospital, the bay had flooded the entire air station and the town of Warrington near-by to a depth of from 2 to 5 feet. This flooding, in conjunction with the high wind, was responsible for the material damage to the station. Buildings were badly flooded from the rising waters of the bay and from torrential rain lashing in through roofs and windows.

Early in the morning refugees began to arrive at the hospital. Bewildered and confused, they flocked into the wards and storehouses, seeking shelter anywhere there was warmth and dryness. Excited voices of men, women, and children, crying babies, and squawking pets, reminded me of public-health work in the slums of the city. With no water supply, heat, or light, caring for these 400 guests at first seemed a problem, but soon we had a place for everyone to rest and sleep. After being served soup, navy beans, "Southern-made biscuits," and coffee made with rainwater, all were dressed in hospital pajamas and given nice, warm blankets.

At sick call, instead of the "Florence Nightingale lamp" the doctor and I used a United States Navy flashlight and visited every patient. When all was quiet and the refugees as comfortable as we could make them, we came off duty for the night. In 36 hours most of the refugees had got things together well enough to leave the hospital.

During the time we were shut off from the outside world a good neighbor, an Army aviator, flying over from Montgomery, Ala., to convey messages, unfortunately zoomed too low, the plane striking the radio tower and falling in the commandant's front yard. The plane took fire, and in a few minutes pilot and passenger were in our morgue. The pilot was the only one who ever successfully landed a plane on Riverside Drive, New York, a few years ago. That was the only fatality connected with the hurricane here.

A HURRICANE THRILL

By ELLEN E. WELLS, Nurse, United States Navy, and MARY HENNEMEIER, Nurse, United States Navy

On Sunday, September 19, we decided to go down to Gulf Beach after church to see how high the waves were, not an unusual sight to us after 22 months on the U. S. S. *Relief*. The trip was well worth the drive of 15 miles to see the high mountains of water come rolling

in on the beach, but even then we had no idea of how strong the wind was blowing until we started back home driving against the wind. More than once we thought our Ford coupé would be lifted off the road by the terrific gusts and set down somewhere else—maybe in the Gulf. We got very nervous and excited before we got home and drew a deep breath of relief when we rolled through our gate.

The sunset that evening was a typical storm sunset. I shall never forget the black clouds massed over the Gulf, shot through and through with indescribable red, wicked-looking rays, and finally at the last just a streak—a most terrible looking streak, resembling a scarlet flash—cutting through the mass across the western horizon.

All the earlier part of the night we sat with the ear phones glued to our ears, so afraid were we of missing the weather reports and where the storm was at that time. We could hear Chicago broadcasting a benefit performance for Miami, and every hour WCOA (Pensacola) would broadcast the progress of the storm here, and New Orleans and Memphis would respond. Finally, at midnight, when we heard that Pensacola was shut off from the rest of the world and we could hear the wind roaring by in great gusts outside, with all the other stations trying in vain to get us and we unable to answer—well, it was a most peculiar sensation, and made still worse by the electric lights going out about 3 a. m.

About 6 o'clock in the morning we could see that the storm was really here and riding high. The commanding officer came by our quarters about 7.30 with a pitcher of hot coffee for us and forbade us going outside on account of the danger. About 8 the people of Warrington, a small town adjoining the navy yard, began coming, for the Gulf by now was in their yards and rapidly rising higher. They "poured" through our gates, mothers with 3-weeks-old babies, children, dogs and puppies, old men and women, and men in bathing suits staggering with children in their arms. How they all managed to walk that distance in the fury of a storm is a miracle.

Empty wards were opened, dry pajamas, sheets, and blankets were provided, and still the storm raged. One of the nurses, coming over to our quarters to get some of her dry clothes for the refugees, was picked up by the wind and pitched head foremost into a rosebush. Fortunately, some men were passing, and they had to make a regular football tackle to pull her out. Another nurse was picked up off our front steps and carried some distance away, but she managed to land on her feet. Another was blown all the way around a building before she could get hold of something to hang on, and gradually get back inside the ward.

None of our cooks could get here, so the corpsmen did the cooking. They made some soup, which, with corned beef and crackers,

no bread, was the menu for dinner. Such a time as we had getting beds for everyone, for we had no electric lights and candles were out of the question on account of the fear of fire; so we wanted our charges all settled before night. Fortunately, no serious accident happened, but there were quite a few minor ailments to be cared for. A stretcher was sent for a paralyzed man, and the corpsmen had to wade through water up to their necks to bring him here.

The hospital is located on a rather high ridge, the highest around here, and by noon the waves were breaking over the sidewalks, tennis and basket-ball courts at the foot of the ridge. Our quarters got the full blast of the wind and quivered like aspen leaves, but somehow were able to withstand the terrible wind.

About 5 the barometer began to rise rapidly and the wind was dying down, so we knew the worst was over. A hasty survey showed no serious damage to the buildings, but our large trees were badly broken, bent, twisted, uprooted, and stripped of all their leaves, and the shrubbery likewise.

By 6 o'clock it was dark and the refugees were settled, some on piles of mattresses in storerooms. Some single beds held three—just any place they could find in the midst of so much confusion. Then—

"The moon came down
Like a silver crown,
To rest on a weary world!"

AN EPIDEMIC OF IMPETIGO CONTAGIOSA

By CAROLINE W. SPOFFORD, Nurse, United States Navy

At the opening of the fall term of the schools located on the Government reservation at Indianhead, Md., embracing first to seventh grades and high school, two cases of impetigo contagiosa were reported. These pupils were sent home, remaining there until recovery was complete. During the next four weeks three cases were reported, and these children were excluded from school. A canvas of the schools a week later revealed 35 cases of the disease.

At a conference of school and medical authorities it was decided to allow all affected children to attend school under supervision. A daily clinic was held at each school, the pupils to be treated, or to be inspected for the disease, being assembled by grades, boys and girls separately. Each child was given a card containing ammoniated mercury ointment, 15 grains to the ounce, to be rubbed into the sores thoroughly by himself; then he was sent to the wash room to cleanse his hands with an antiseptic soap which had been provided. If the lesions were very large and open, treatment was given by the nurse, and all open lesion bandaged. If the child was found

to have cuts or deep scratches these were also bandaged for protection. Supplementing this treatment each patient was given a bar of antiseptic soap and a box of ointment, and printed instructions as to care of the sores, clothing, etc., were sent to the parents. Thorough cleansing at home with hot water and the soap, followed by application of the ointment to old sores and to the first sign of new spots seemed to give excellent results. It was advised that finger and toe nails be kept clean and closely cut, as the child in most cases was inclined to scratch the sores and the surrounding area.

After treatment was thus begun, the pupils cooperated heartily. While having his treatment, one little fellow said, "It hurts, but I must bear it." Another boy, in order to make it known that there was cooperation at home, said, "Mama greased me all over before I came to school this morning."

Many cases healed rapidly, but new cases were reported daily, and on October 21 there were 105 cases under treatment. On November 1 a very perceptible decrease was noted. Patients were being discharged daily, with a minimum of new cases being reported and, from that time on, it was felt that the epidemic was under control. In the majority of cases recovery was complete in from one to three weeks. Three very stubborn cases, however, ran from 40 to 45 days. Where cases were of long standing and the sores were particularly hard to heal, with new sores constantly appearing, follow-up work was done in the homes, and parents were asked to go to the doctor for consultation.

In 21 cases the disease was recurrent, but prompt treatment resulted in recovery of 13 cases in from 2 to 5 days, 4 cases in from 7 to 9 days, 3 cases in from 14 to 17 days, with 1 case which ran 3 weeks.

Out of an enrollment of 313 pupils, 144 suffered from the disease. In a number of cases children had boils as well as impetigo.

This having been a new method of handling a contagious-disease situation makes the epidemic interesting. Instead of keeping children out of school, thus interfering with their studies, they remained in school under treatment without breaking up class routine. It is felt that the results have been better than if they had been allowed to remain in their homes, which in this particular case cover a wide area, so that proper treatment under supervision would not have been possible.

This method has been justified by the history of the epidemic. Before treatment as outlined was started there was a continual increase in the number of cases, but soon after treatment was instituted there was a sudden drop in the number of new cases.

NOTES AND COMMENTS

A NEW SECTION OF THE BULLETIN

Beginning with this number of the BULLETIN, a section will be devoted to the affairs of the medical officers of the United States Naval Reserve. In it there will be published instructions to medical officers of the reserve, notices of selections made for promotion, brief notices of the activities of individual members of the reserve, and such other items of interest as will serve to keep the reserve informed of what is being done by the department to further its interests and to enhance the value of the reserve to the Navy as a whole.

It is hoped that members of all classes of medical officers of the reserve will send in, from time to time, items of interest concerning the parts played by them in the organization, as well as such suggestions as they desire to make for its betterment. Constructive criticism will be welcomed and, when possible, will be published in the Naval Reserve section of the BULLETIN with a view to stimulating discussion which may result in improvement.

Medical officers of the reserve are invited to submit questions for discussion in this section of the BULLETIN, which will attempt to answer them fully.

All medical officers of the reserve should receive the BULLETIN regularly. If there are any who fail to do so, it is requested that the bureau be notified in order that our mailing list may be corrected.

Through these pages it is hoped that the reserve and the regular Navy may be brought closer together, with mutual advantage. It is the desire of the bureau that officers of the reserve should feel that they are an integral and important part of the Navy, whose services in time of emergency are not only needed but greatly appreciated, and that the BULLETIN is their official publication as well as the official organ of the Medical Corps, United States Navy.

CHANGE IN CHARACTER OF EXAMINATIONS FOR PROMOTION

The forthcoming revision of the Manual of the Medical Department will contain the information given below. As some examinations may be held before this revision has reached all medical de-

partment personnel it is considered advisable that this advance information be given.

Examination for advancement to the rank of commander (grade of medical inspector).—This examination will be predominantly professional in character, comprehending the subjects of medicine, surgery, and preventive medicine, but including also questions pertaining to medical department organization and administration.

Examination for advancement to the rank of captain (grade of medical director).—In this examination questions are asked in the subjects of medical department organization and administration, hospital plans and construction, hygiene and sanitation, Navy Regulations, and Manual of the Medical Department.

Examination for advancement to the rank of rear admiral.—This examination will consist of a previously prepared thesis, or under specified circumstances, of a review of the candidate's record.

HOSPITAL CORPS INSTRUCTION

The bureau has on numerous occasions received complaints that Hospital Corps men, especially in the lower ratings, are of little or no value to the service, due to the lack of sufficient training.

Considering the four-year enlistment, it is believed that the four months now devoted to the course at the Hospital Corps training schools constitutes the longest period that can be given to academic instruction. Hence, if the deficiencies noted are to be corrected, the responsibility for continuing the training of Hospital Corps men rests entirely with medical officers of ships and stations to which they are attached. Navy Regulations, the Bureau of Navigation Manual, and the Manual of the Medical Department point out the necessity for continuing an intensified course of instruction in all routine duties of the Hospital Corps. It is but fair to the Hospital Corps men concerned, as well as to the service, to remind medical officers both ashore and afloat of this necessity, in order to prepare men for their actual duties as well as for advancement to higher rating.

In connection with the above, the following extract from the Manual of the Medical Department now under revision, and which will be issued shortly to the service, is quoted for the information and guidance of all medical officers:

655. *Training of Hospital Corps men.*—(a) (1) The systematic training of Hospital Corps men is of great importance. At all activities where one or more medical officers are attached, instructions in both practical and theoretical work of the Hospital Corps shall be routine, in accordance with instructions contained in the Bureau of Navigation Manual.

(2) Not less than one hour daily, four days per week, shall be devoted to classroom instruction of the Hospital Corps, for all rates below that of chief pharmacist's mate at all such Medical Department activities ashore and afloat with this exception; namely, that pharmacist's mates, first class and second class, may be excused at the discretion of the medical officer, provided their

service records show that they have satisfactorily completed the instruction schedule on some other ship or station.

(3) Courses shall be continuous and progressive and shall cover the following subjects:

Clerical forms and procedures.

Dosage of ordinary drugs; dosage and restrictions of poisonous drugs.

Management of common diseases and injuries.

First-aid treatment in emergencies.

Preventive measures: Vaccination, antityphoid, and venereal prophylaxis.

Practical work in nursing, pharmacy, urinalysis, and microscopic technique where activities are equipped with microscopic outfits.

(4) On activities where medical officers are not available as instructors for the complete schedule of instruction, pharmacists, chief pharmacist's mates, nurses, and qualified technicians may be detailed as instructors for not more than half the total work given.

(5) On completion of the schedule of instruction, a notation should be attached to the service record of every Hospital Corps man who has completed the course, with marks assigned on the various subjects covered, to provide a permanent record of instruction received.

(b) The Bureau of Navigation Manual directs the attention of all commanding officers to the urgent need of trained Hospital Corps men for vessels to which no medical officer is attached. Therefore all chief pharmacist's mates, and pharmacist's mates, first class, will be considered sufficiently trained and shall be considered available for this type of duty.

To obtain a uniform method of instruction, and to avoid repetition, all medical officers will hereafter be guided by the foregoing, which cancels and supersedes all bureau letters, circular letters, and other instructions heretofore issued on the subject of Hospital Corps instruction at activities other than Hospital Corps schools.

DUTY AT SEA

1. *Officers' tours of duty at sea.*—In compliance with the recommendations of the commander in chief, United States Fleet, and the commander in chief, Battle Fleet, the Bureau of Navigation announces as a policy, except for circumstances that can not be foreseen at the time of issuing their orders, that tours of duty (at sea) for commanding officers, executives, and heads of departments will be for periods of not less than two years.

Changes in duty of officers senior to ensigns at sea prior to the completion of a full cruise will be made only to fill vacancies caused by casualty, or to effect changes recommended by the commanding officers concerned and approved by the flag officer.

HANDLING POISONS

A recent unfortunate occurrence in one of our naval hospitals makes it advisable to call the attention of medical officers to the necessity of exercising great care and watchfulness in the use of

poisonous substances for disinfecting toilet bowls, tubs, floors, and utensils used by the sick.

In the case referred to, *Liquor cresolis compositus*, or some other similar disinfectant, was placed in a medicine glass preparatory to its being poured into a toilet bowl. The nurse in charge of the ward handed it to a corpsman with instructions that it be given to ———, referring to the corpsman in charge of the head. Unfortunately, a patient in the ward had a name similar to ———. He was given the disinfectant, drank it, and, as a result, died.

Such a thing could not have happened had the poison been placed in a container of such a character that it could not easily be confused with a medicine glass. Graduate glasses might be used for this purpose without danger.

The bureau considers that medicine glasses should not be used for any purpose other than the administration of internal medicines or as containers for harmless drugs. Further, the bureau will hold that the last person who removes a poisonous drug or disinfectant from a distinctively marked container is the one who is responsible for its proper disposition.

LABORATORY TECHNICIANS

The Bureau of Medicine and Surgery has adopted the policy of detailing laboratory technicians to destroyer tenders. Hospital corpsmen so qualified are, however, not supplied in addition to the authorized complement and for this duty alone. It is not the bureau's intention that these men shall serve merely as specialists, as it is believed the laboratory procedures on board a vessel afloat are not sufficiently extensive to require the entire services of a laboratory technician. Men assigned to tenders for this duty are to be considered a part of the authorized complement, and are available for all routine duties of the Hospital Corps, performing in addition the duties of the specialty for which they were trained at the Naval Medical School.

In this connection, the bureau wishes to call the attention of medical officers and Hospital Corps men to the desirability of having laboratory technicians visit laboratories of hospitals, civil and otherwise, in ports of call. Such visits shall be made for the purpose of inspecting the equipment and routine of other institutions, with a view to the betterment of laboratory service on board ship. It is especially desired that technicians on visits of this nature shall compare their own methods of making Kahn standard readings with those of hospital laboratories, with a view toward acquiring correct standards in the reading of flocculation tests.

THE HENRY S. WELLCOME MEDAL AND PRIZE FOR 1927

With the approval of the donor it has been decided that, beginning with this year, the two prizes hitherto offered by the Association of Military Surgeons of the United States will be combined into one, which will consist of a gold medal and \$500.

This year the prize will be awarded to the writer of the best paper on the subject: "In consideration of the physical disabilities found in the drafted men and volunteers of the World War, what practical hygienic measures are advisable for school children in the United States?"

The competition is open to all medical officers, former medical officers, acting assistant and contract surgeons of the Army, Navy, Public Health Service, Organized Militia, United States Volunteers, and of the reserves of the United States, and commissioned medical officers of foreign military services. It is not necessary that competitors be members of the Association of Military Surgeons.

Each competitor must furnish five copies of his paper. Papers must be signed with a nom de plume or some distinctive device, and not with the true name of the writer. They must be forwarded to the secretary of the Association of Military Surgeons of the United States, Army Medical Museum, Washington, D. C., so as to arrive not later than September 1, 1927, and be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title, and address. The essay must be between 3,000 and 10,000 words in length.

The winning essay becomes the property of the association and will be published in the *Military Surgeon*. Should any paper be considered worthy of "first honorable mention" the writer thereof will be awarded life membership in the Association of Military Surgeons.

As such a large number of persons are eligible for this competition it is probable that a large number of papers will be submitted. Among them should be several from naval medical officers. The prize is worth winning for its money value, but the honor of winning such a competition is worth even more.

MICRO-KAHN REACTIONS

Since the Kahn precipitation test has been made the standard laboratory procedure to be used by the Navy in the diagnosis and treatment of syphilis, any improvement in the technique of conducting the test or any change in the method should immediately be brought to the attention of naval medical officers. The best way

to accomplish this would seem to be to publish in the *BULLETIN* anything new that is brought out concerning the test.

Although all medical officers have access to the *Journal of the American Medical Association*, a short paper by Doctor Kahn describing his new micro-reaction, which appeared in the December 18, 1926, number of that periodical, may have escaped the attention of some of them. It is, therefore, quoted in full in order that medical officers may familiarize themselves with the test, try it out, and report their results to the bureau.

Doctor Kahn says:

It is not generally recognized among physicians that the Kahn test can be performed with a drop or even half a drop of serum with a high degree of accuracy. In isolated cases, especially when drawing blood from infants, it is often difficult to obtain 1 cubic centimeter, the minimum amount required for a regular three-tube Kahn test. In such cases, this laboratory during the last several years has been reporting to physicians the results of a one-tube test, utilizing the amount of serum available.

One of the basic requirements of the Kahn reaction is the use of correct proportions of serum and antigen. When this is adhered to any measurable amounts of serum and antigen can be utilized in performing a Kahn test.

The following plan is being carried out when sufficient serum (0.45 c. c.) is not available for a complete three-tube Kahn test.

1. If 0.3 cubic centimeter is available, a two-tube test is made, employing the two lesser amounts of diluted antigen (0.025 and 0.0125 c. c.). The results are averaged as though a regular three-tube test were made.

2. If 0.15 cubic centimeter serum is available, a one-tube test is made, using the smallest amount of diluted antigen (0.0125 c. c.). In this case, a definite precipitation reaction, such as + + + +, + + +, or + +, is read positive; all others are read negative. The results are reported "Positive (or negative) based on incomplete test; insufficient serum for complete (three-tube) Kahn test."

3. When less than 0.15 cubic centimeter serum is available, a test is made using a proportion of 10 parts of serum to 1 part of diluted antigen. Thus, if only approximately one-half drop (0.025 c. c.) of serum is available, the test is performed as follows: 0.0025 cubic centimeter diluted antigen is measured with a 0.1 or 0.2 cubic centimeter pipet graduated in 0.001 cubic centimeter and deposited at the bottom of a small tube of about 0.5 cubic centimeter diameter. With a similar pipet, 0.025 cubic centimeter serum is added close to the bottom of the tube. The rack is shaken three minutes, 0.2 cubic centimeter of physiologic sodium chloride solution is added, and the results are read. The report to physicians is made as in test 2, outlined above.

Similarly, Kahn tests can be carried out with 0.1 and 0.05 cubic centimeter amounts of serum, using 0.01 and 0.005 cubic centimeter of diluted antigen, respectively. Repetition of the test with physiologic sodium chloride solution instead of serum serves as the antigen control. Examination of the serum to establish freedom from cells and other particles serves as the serum control.

4. Micro-amounts of serum may be utilized not only for obtaining qualitative results with the Kahn test but for quantitative results as well. Thus, if 0.05 cubic centimeter serum is available, a test with 0.025 cubic centimeter described above, may be run to determine whether the reaction is positive

or negative, and if positive, the remaining 0.025 cubic centimeter may be utilized for a quantitative procedure, thus giving the clinician the actual potency of the serum in terms of syphilitic reacting units.

SUMMARY

Micro-Kahn reactions with minute amounts of serum, such as a drop or less, can be carried out with a high degree of accuracy. Both qualitative and quantitative microprocedures can be employed. Such procedures should prove of help to physicians in cases in which it is difficult to obtain sufficient blood for regular Kahn tests.

STREPTOCOCCUS CARDIOARTHTRITIDIS

The announcement of a discovery of far-reaching importance is made in the January, 1927, number of the American Journal of the Medical Sciences, by James Craig Small, M. D., of the Bacteriological Laboratory of the Philadelphia General Hospital and the Graduate School of Medicine, University of Pennsylvania. Doctor Small in this paper presents to the world the organism that, as a result of his experimental work, he considers the causative agent in acute rheumatic fever, and a serum prepared with it which is effective against the disease.

The name suggested by Small for this organism is *Streptococcus cardioarthritidis* (spec. nov.).

The first strain was isolated from a blood culture made April 5, 1926, from an adult colored man whose illness began with tonsillitis, which was followed quickly by joint involvement. The joint condition was definitely due to acute rheumatic fever. The culture was made in infusion broth of an acidity of pH7.6, and showed turbidity on the ninth day. Smears from the culture showed a Gram positive, short chain coccus which, on April 16, 1926, agglutinated with the patient's serum in dilutions up to 1 to 320.

Tests for pathogenicity were made by injecting young broth cultures into two rabbits. The first rabbit suffered no ill effects from the inoculations, but developed a very high titer serum, which was subsequently used in the treatment of a patient. Rabbit No. 2 developed typical arthritic lesions involving the knee joints. At autopsy, multiple chronic focal inflammatory areas were found in the myocardium.

Later, other rabbits were inoculated with the growth from the broth cultures. One died the next day of an acute intoxication. Another developed a central nervous system lesion which was followed in three weeks by an arthritis from which it was still suffering seven months later. Still another rabbit was found dead the day after it received its third inoculation. The heart muscle fibers were swollen

and had lost their striations. In several sections, collections resembling Aschoff bodies were found about the blood vessels.

Up to the time of the writing of the article being discussed, 31 strains of streptococci had been isolated, all of which were agglutinated by the antiserum prepared from rabbit No. 1.

A description of the organism, *Streptococcus cardioarthritidis*, is given by Small. Briefly, it is a Gram positive coccus which grows in short chains in a fluid medium; it stains readily; is nonmotile, aërobic and facultative anaërobic; varies slightly in size—0.7 micron to 1.2 microns in diameter; grows best at 37° C.; is insoluble in bile; is killed at 60° C. in from 6 to 10 minutes; there is no digestion of the medium when grown on coagulated serum. Glucose, sucrose, inulin, raffinose, and salicin are fermented with acid formation but no gas. Mannitol is not fermented. Lactos was fermented by 14 strains, and not fermented by 7. The appearance on blood agar is characteristic. There is not the slightest hemolytic action. The colonies are of an opaque, red-brown color by transmitted light, and of a gray-white by reflected light. They are regular in outline, round, and vary in size from pin point to 1 millimeter in diameter. They are soft and pasty, and do not lift off of the agar in their entirety.

The first serum used in treatment was, as has been mentioned above, obtained from the first rabbit inoculated. A patient suffering from chorea and arthritis was given 20 cubic centimeters of the serum, intramuscularly. The clinical symptoms terminated by crisis. A horse was then immunized, and a serum which had a titer of 1 to 2,560 was obtained in two months. This serum was used in subsequent treatments. Inoculation of the horse with live organisms has been continued and, at present, the serum agglutinin titer is higher. Case histories of nine patients treated are given. The author realizes that this is too small a series to support definite conclusions as to the absolute specificity of the serum, but the results in these cases have been striking.

In addition to the use of serum, Small has used vaccines prepared from *Streptococcus cardioarthritidis* in subacute and chronic cases with encouraging results.

Of the nine cases treated, two were found to be suffering from disease other than acute rheumatic fever, and these received no benefit from the serum. In the other seven, prompt improvement followed the injections. That the improvement was due to the specific action of the serum, and not to the foreign-protein reaction, is the belief of the investigator, based upon the fact that the beneficial action is prompt and sometimes coincides with a decline in temperature. Also the effect is constant, and is apparently of a more permanent character than that which follows foreign-protein therapy.

The relief of symptoms—pain in arthritis and choreiform movements in chorea—is more gradual than is the sudden temporary relief that so frequently follows the injection of foreign protein.

Small considers that the beneficial action of the serum is due to its content of antitoxin rather than its bactericidal action, and, should his results be supported by further experience, proves the *Streptococcus cardioarthritidis* to be the specific cause of acute rheumatic fever and its complications.

Koch's postulates have not been fulfilled with this organism. They probably will be, according to its discoverer.

It is too early to form an estimate of the immense value of this discovery, should Small's work be confirmed by others and the specificity of the serum established beyond doubt. It is hoped, however, that its use early in a first attack of acute rheumatic fever will prevent damage to the heart and that its later use, after the heart has become diseased, will put a stop to the progressiveness of the heart disease and result in healing.

It seems that attacks of chorea can be terminated abruptly by its administration. It is possible that a large group of chronic arthritides may be due to this organism and that these may be greatly benefited by the use of the serum.

Much work remains to be done before absolutely final proof of the specificity of the organism and serum is established. Small and his coworkers are carrying on further experimentation and they express the hope that others will also investigate the organism. Undoubtedly this will happen, and, in the near future, proof or disproof of Small's claims should be forthcoming. In the meantime, there seem to be valid ground for hope that another great discovery has been made in medicine; one that will rival the discovery of insulin in its importance.

PROGRESS IN DERMATOLOGY

Under the title above, Harvey P. Towle, in the Boston Medical and Surgical Journal for November 11, 1926, reviews the literature of the year dealing with dermatology. Much that he has to say is of interest to naval medical officers who are constantly called upon to treat skin diseases of all degrees of severity, but, fortunately, usually mild. Some new points are brought out and, for this reason, an abstract of the paper is here given.

Towles' paper deals chiefly with advances in therapeutics, but diagnosis and prognosis, as well, receive a certain amount of attention.

In the discussion of therapeutics, the author calls attention to the series of articles on The Technic of Medication prepared by Dr. Fantus. (J. A. M. A. 86: 6, 415, 1925.) He says of diadermic adminis-

tration of drugs, that it is not a quick way of getting medicaments into the circulation, but is useful when action on the alimentary canal is to be avoided, and that it is not objectionable on the grounds of dirtiness as, after proper massage, the excess of the ointment may be removed with gasoline without diminishing the therapeutic efficiency of the method. Fantus further warns against the use of vanishing creams, so popular to-day as substitutes for cold cream, because they are not cold creams at all, but soaps formed by a reaction between stearic acid and an alkali, and soap is contraindicated in many cases where real cold cream is of value.

In the treatment of chancroid ulcers, vaccines are being extensively used by the French. Cultures of the streptobacillus of Ducrey from the washed lesions are made. From these suspensions are made, filtered, and sterilized. This preparation is then used as a moist dressing. With no other treatment, this is reported to result in rapid healing. Others report equally good results with moist dressings of a stock vaccine containing the organisms usually associated with the Ducrey bacillus, but lacking that bacillus itself. Still others report favorable results from the injection of Nicolle's vaccine.

In regard to mercurochrome, the writer, in spite of favorable reports from its strong advocates, finds it difficult to believe that any one remedy can affect favorably so many different disease conditions. Eldredge reports cases of erysipelas treated by swabbing with 5 per cent mercurochrome solution in which excellent results were secured with one or more treatments. (Ann. Clin. Med., 4: 333, 1925.)

Weirauk (Ohio State Med. J., 22: 305, 1925) states that in the treatment of carbuncles, milk injections are very valuable. Improvement occurs promptly. If it does not show itself after four days, surgical treatment should be instituted. He also considers nonspecific protein injections of value in syphilis and furuncles.

In studying ivy poisoning, Kräuse and Weidman found that the degree of susceptibility varied widely in the nonimmune; that attacks seemed to shorten subsequent attacks; that the disease is not spread by the secretions from the lesion; and that in about one-half of the susceptibles it is necessary that the skin be broken before an attack can be provoked. They were unable to show that the Strickler-Schamberg method of desensitization conferred immunity.

Markey's method of treating plantar warts, as published in the BULLETIN, is described, but is considered by the reviewer as being too uncertain in its results.

Skin eruptions following the use of drugs of various kinds are described. Even insulin has been reported as causing urticaria and other forms of edematous eruption. Phenolphthalein has caused bright red, erythematous plaques widely scattered over the body.

One case of a rash due to luminal is mentioned. Goeckermann reports 11 cases of permanent pigmentation of the skin due to face powders (J. A. M. A., 84:506, 1925), in addition to 2 he had previously reported.

McHutchinson and Brown (Lancet, 1:755, 1926) have, during the year, reported interesting new developments in radium therapy, making use of the later disintegration products of radium. Radium D and radium E elements have been extracted from radium emanation tubes and used in the form of applicators. Radiations from these elements are absorbed by the skin and their effective penetration is only about 3 millimeters of tissue. They have been found useful in the treatment of *lupus erythematosus* and *nevi*.

The dangers of radioactive substances have been pointed out by various writers who have concluded that radium introduced into the body is deposited in minute quantities in the reticulo-endothelial system, from whence it bombards the hematopoietic centers, finally destroying them, and leads to pernicious anemia. Necrosis of the jaw is reported by Hoffman (J. A. M. A., 85:961, 1925) among workers in a luminous watch-dial plant who moistened the tips of the brushes with which the luminous paint is applied with their lips, thus getting a small amount of the paint in their mouths frequently.

The well-known dangers of X rays have been discussed by several writers. Freund (Wien. klin. Wchnsch., 39:349, 1926) calls attention to the advisability of protecting the deep tissues as well as the surroundings in treating diseases of the skin, and to the fact that it is injurious to use hard rays on superficial skin diseases. Gourin (Bull. Med. Paris, Sept. 13, 1924) has used the X ray in the treatment of *lichen planus*. He applied the rays to an itching patch and found that within 24 hours the itching ceased and within three weeks the patch disappeared. This did not work in a second case, so he applied the rays to the intrascapular region, where no patch existed, and found that the eruption began to fade. The result was attributed to action of the rays upon the sympathetic nerves in the region exposed. Success was also met with in 10 other cases treated similarly. Spillman and Watrin divided the spine, from the first dorsal to the fifth lumbar, into five regions and exposed each field to a dose of 3-4 H units in order to obtain direct action upon the spinal cord. They also cured their patients.

Warthin (Arch. Path., 1:64, 1926) reported necropsies on two cases of *acrodynia* or *erythredema*. He found no evidence that a polyneuritis was the essential feature of the disease, nor could he find evidence of a specific etiological infection or of any connection between disease of the tonsils and *acrodynia*. The picture suggested

a food deficiency condition or one due to a toxic action in persons of a hypoplastic constitution.

Interesting cases of *urticaria* due to exposure to sunlight have been studied and reported.

Pilcher (Am. J. Dis. Child., 31:77, 1926) found that wheal formation was lessened in all cases of edema, while it is normal in nephritis without edema and in valvular and congenital heart disease without edema. He also found that low serum calcium and phosphorus did not interfere with wheal formation. This led him to the conclusion that the administration of calcium in *urticaria* was without value.

Duke's theory that *urticaria* is a manifestation of physical allergy is discussed at length. Physical allergy means sensitiveness to physical agents, as heat and cold.

A close relationship seems to exist between *herpes zoster* and *varicella*. Lipschütz and Kundratitz (Wien. klin. Wchnschr., 34:497, 1925) have succeeded in inoculating the cornea of a rabbit with the contents of a vesicle of *zoster* and in recovering *zoster* bodies. Children up to 5 years of age are susceptible to inoculation with the virus. Some patients, after an incubation period of from 5 to 15 days, developed an eruption indistinguishable from chickenpox. Other children who came in contact with them developed an eruption which was diagnosed as chickenpox. The serum from *zoster* convalescents protected against *varicella*. *Zoster* is not common in childhood; chickenpox is. The author raises the interesting question as to whether the vesicles of *varicella* might not, occasionally, be arranged in the form of *herpes zoster*.

It has become common to regard all scaling and vesicular eruptions of the toes and fingers as due to fungus infection. Cornblut (Arch. Derm. and Syph., 13:5, 1926) suggests that this is not the case, but that the frequent finding of fungi is simply an evidence of the widespread distribution of fungi rather than of any pathogenicity. Burgess (Arch. Derm. and Syph., 12:12, 1925) demonstrated that the same fungus may produce clinically different types of lesions in different persons and that different fungi may produce clinically identical lesions.

The fungicidal properties of volatile oils have been studied by Myers and Thienes. They found that a mixture of 5 per cent thymol and 2 per cent cinnamon, in the form of a spirit, painted on the site of the lesion, gave prompt relief.

Lupus erythematosus can not, at present, be ascribed only to tuberculosis. All that can be said is that it is of toxic origin. The tubercle bacillus, however, is still considered one of the chief causes.

The study of leprosy has received new impetus through the hope of cure held out by the ethyl ester of chaulmoogra oil. Fordyce and

Wise (Arch. Derm. and Syph., January 1, 1925) made a study of leprosy in New York City in which they showed that a laboratory diagnosis can not always be made and that, in these cases, the work now being done in sero-diagnosis may prove useful. They also showed that, while leprosy is contagious, it is only slightly so. Goodpasture obtained positive Wassermann reactions in 60 per cent of the cases of untreated leprosy tested.

As to the way in which leprosy may be contracted, Callender and Bitterman (Philippine J. Sc., 27:9, 1925) favor the theory of entrance of the organism through an abrasion of the skin.

Nothing of real value has been discovered concerning *psoriasis*, although report was made of three cases treated with insulin. The results were indeterminate.

Fraser (Arch. Derm. and Syph., 12:6, 1925) believes that the tissue changes in *mycosis fungoides* are neoplastic from the beginning and that there is a genetic relationship between mycosis fungoides, lymphosarcoma, and lymphatic leukemia. In the late stages of mycosis fungoides, a blood picture indistinguishable from lymphatic leukemia may develop.

MITRAL REGURGITATION

An important study of mitral regurgitation was made during 1926 by Drs. H. B. Sprague and P. D. White, at the Massachusetts General Hospital, and a report made by them in the American Heart Journal (1:5; June, 1926). This work is of special value to the military services because of the necessity of evaluating properly the findings in physical examinations preliminary to acceptance for the service, and to determine fitness for duty.

The authors review the changing of opinions regarding apical systolic heart murmurs, from the days when the diagnosis of mitral regurgitation was established if they were present; through the war period, when MacKenzie and Lewis taught that they should be disregarded if the response to an exercise test indicated an adequate heart muscle; until the present-day teaching of the nonexistence of uncomplicated mitral regurgitation by Dr. Richard C. Cabot.

The fallacy of Cabot's statement is then demonstrated.

It is pointed out that Cabot arrived at his conclusion from autopsy statistics, and that autopsy findings are valueless in this instance, because in rheumatic mitral disease regurgitation is one stage in the process while stenosis is the terminal condition.

An examination of the records of 366 cases showed organic mitral regurgitation alone in 29 instances. The diagnosis was based on the presence of a constant, loud systolic murmur, originating at the apex,

associated with enlargement of the heart, in the absence of factors producing dilatation.

Twenty of these patients with mitral regurgitation were studied in detail. The significant findings were:

(1) *Age*.—Fourteen cases were 15 years old or younger. Six were 19 or older.

(2) *Etiology*.—Rheumatic fever, 10; chorea, 1; tonsillitis, 6; scarlatina, 4.

(3) *Symptoms*.—Twelve patients were symptom-free. The remainder complained of slight dyspnea on exertion (4), palpitation (2), easily fatigued (2).

(4) *Teleröntgenograms*.—The average heart shadow is 1.2 centimeters too wide by the cardiothoracic ratio. Evidence of hypertrophy of the left ventricle was frequently found.

(5) *Electrocardiograms*.—Abnormalities were insignificant.

Twenty cases of uncomplicated mitral stenosis were studied for comparison.

Among other conclusions the authors state that (1) loud, apical systolic murmurs unaccompanied by diastolic murmurs can not be disregarded, but should be judged in relation to history, other physical findings, and X-ray measurements of the heart. (2) Pure organic mitral regurgitation is a clinical entity, but is rarely, if ever, fatal. It is one stage of a process in which stenosis is the terminal condition.

CUTANEOUS LEISHMANIASIS AND THE PHLEBOTOMUS

S. Adler and O. Theodor, of the Microbiological Institute, Hebrew University, Jerusalem, in a letter to the editor of *Nature* published in that periodical November 13, 1926, call attention to the fact that they have recorded three undoubted examples of the transmission of cutaneous Leishmaniasis to man from naturally infected sandflies, *P. papatasi*. Because, however, they had obtained negative results from experiments conducted in 1925 with flagellates from sandflies artificially infected by feeding on oriental sores, in spite of the fact that *P. papatasi* is a proved carrier of *Leishmania tropica*, these workers performed further experiments to determine at what stage *L. tropica* in the sandfly becomes infective.

In this series of experiments Adler and Theodor were able to follow a strain of *L. tropica* through four successive generations of hosts:

(1) A sandfly (naturally infected).

(2) A human being experimentally infected from (1).

(3) Laboratory-bred sandflies infected from (2).

(4) Human being infected from (3).

As a result of these positive findings, the final link in the chain of proof that *Phlebotomus papatasi* is a transmitter of cutaneous Leishmaniasis is forged.

In a paper by these same authors, which appeared in *Annals of Tropical Medicine and Parasitology* (20; 4, December 17, 1926), it is shown that there is a diversity of forms of *Leishmania tropica* and that not all of these forms are infective for man.

Conclusions reached by Adler and Theodor are:

Herpetomonas papatasi is a synonym of *Leishmania tropica*. *Leishmania tropica* is a natural parasite of *Phlebotomus papatasi* and the proof that the latter is a natural carrier of cutaneous Leishmaniasis is complete.

There is no relationship between a strain of *Leishmania tropica* and the clinical type of cutaneous Leishmaniasis produced in man.

MEDICINALS AND DYES

The part played by medicine in the development and keeping alive of the dye industry of America is no small one, as is shown in an article by Ernest H. Volwiler in the December, 1926, number of *Industrial and Engineering Chemistry*.

The author reminds us that dyes would continue to be manufactured even if medicinal products should be no longer made. However, the two branches of the industry are closely allied.

While dyes are almost all coal-tar products, many of our drugs are not, but the total value of coal-tar drugs produced is not so small, when compared with the total value of dyes manufactured in the United States, as one might expect. According to the census report for 1925, 86,000,000 pounds of finished dyes were produced in the United States during that year. Only three and one-third million pounds of synthetic medicinals were produced in the same time. The former sold for \$37,000,000, or \$0.466 per pound. The drugs were sold for \$6,333,333, almost \$2 per pound. In other words, 4 per cent in quantity was worth 17 per cent in money. This statement applies only to the synthetic drugs of coal-tar origin, and does not consider the nonsynthetic products, such as alkaloids, glandular extracts, etc.

In 1925, 1,476,000 pounds of aspirin, worth \$1,025,000, were sold. This was the largest amount of any of the coal-tar products sold during that year, but other drugs, acetanilid, sodium salicylate, and others, were also produced in large volume.

The arsphenamines, of course, did not approach in quantity some of the other products, but their money value was more than \$1,500,000.

Dyes themselves are being used in increasing quantities as therapeutic agents, for the reason that the chemical structure of the dyes seems to give these substances a selective affinity for many bacteria. Among the dyes used in medicine may be mentioned acriflavine, mercurochrome, the methyl violets, methylene blue, and the

diagnostic dyes, tetraiodophenolphthalein, and phenolsulfonphthalein.

Products of the dye industry which have all the properties of the dyes except their staining quality are assuming greater importance in medicine from day to day. Bayer 205 is an example of these substances.

The author compares the drug industry of 10 years ago with that of to-day. Ten years ago the manufacture of synthetic medicinals was relatively unimportant as compared with the production of alkaloids and other active principles of plants. To-day the synthetic drugs are produced in far greater quantity, and very few important drugs of this type are not now manufactured in the United States. Furthermore, the author says that 10 or 20 years from now the condition of the dye industry in America will depend not so much upon the items now being manufactured as upon the new products developed by research in the medicinal chemical field. This is recognized by the important manufacturers of the country, and all of them are busily engaged in research along this line, which will undoubtedly lead to valuable results.

Among the new and valuable synthetic medicinals produced in America during the past 10 years are mentioned:

GENERAL ANESTHETICS: Ethylene, propylene, butylene.

LOCAL ANESTHETICS: Apotheresine, butyn, butesin, butesin picrate.

BENZYL ESTERS: Benzoate, stearate, fumarate, succinate.

CHLORAMINES: Chloramine, dichloramine, halazone.

ANTISEPTICS: Dibromin, hexyl resorcinol.

HYPNOTICS: Neonol, amytal, ipral.

ARSENIC COMPOUNDS: Sulfarsphenamine, tryparsamide.

MERCURY COMPOUNDS: Mercurochrome, mercurosol, metaphen.

BISMUTH COMPOUNDS: Tartrate, salicylate, and others.

DYES: Tetraiodophenolphthalein, phenolsulfonphthalein.

RECTAL FEEDING

During 1925 some experiments were conducted by T. M. Carpenter in an endeavor to determine the question of utilization by the body of food substances introduced into the rectum. The report of these experiments was made in Carnegie Institution Publication No. 369, December, 1925, and abstracted in *Nature*, December 11, 1926. It is from this abstract that the notes which follow were obtained.

Four healthy medical students were the subjects of the experiments, the substances tested being alcohol, dextrose, and levulose. Determination of their absorption when introduced rectally, their excretion in the urine, and their influence upon the respiratory exchange, the pulse rate, and the composition of the urine was made.

The details of the methods of conducting the experiments are given, but are not important for the purpose of these notes.

Alcohol, injected in a 5 to 10 per cent solution in 0.6 per cent sodium chloride, was almost completely absorbed. Signs of intoxication could be produced. Small amounts of alcohol were excreted in the urine. If the subject slept during the experiment, more alcohol appeared in the urine. Marked diuresis resulted, and nitrogen and sodium chloride in the urine were reduced. There was a fall in the respiratory quotient, a rise in the pulse rate and in oxygen consumption.

The administration of dextrose or levulose by rectum produced similar results, except that there was a rise in the respiratory quotient rather than a fall. Sixty to ninety per cent of the dextrose and 50 to 100 per cent of the levulose was absorbed in the experiments. The levulose solution was the most difficult to retain. A slight fall in the nitrogen and sodium chloride output followed the injection of dextrose; a marked fall that of levulose. The respiratory quotient and pulse rate increased after both, and there was a little alteration in the oxygen consumption.

As a result of the experiments the author reaches the conclusions that alcohol, dextrose, and levulose are metabolized by the body; that alcohol replaces in metabolism all the foodstuffs in the proportions in which they are being utilized at the time; that enough carbohydrate for the needs of the body for two or three hours is supplied by the dextrose absorbed; that most of the levulose is retained in the body without oxidation.

The fate of these substances in the body may depend upon whether or not the liver is in an active condition. If the rectal administration occurs long after a meal the liver is probably relatively quiescent at the time.

The practical clinical value of these experiments lies in the establishment of the fact that if rectal feeding must be resorted to, alcohol and dextrose are the substances which should be chosen for the purpose.

EPIDEMIC ENCEPHALITIS

"The Sheffield Outbreak of Epidemic Encephalitis in 1924" is the title of a report of the Medical Research Council, published in 1926 by His Majesty's Stationery Office, London. In it Prof. F. E. Wynne, M. B., analyzes the cases which occurred in this epidemic—301 in all—as to epidemiology, mode of invasion, evidence of infectivity, and relation to social conditions. In addition, pathological investigations carried out at the University of Sheffield are reported by Prof. J. S. C. Douglas, D. M., and an elaborate clinical report

is made by Prof. A. J. Hall, M. D., F. R. C. P., and A. Gurney Yates, M. D., M. R. C. P. An appendix by J. R. Perdrau, M. B., B. Sc., gives a summary of the recent researches into the etiology of this condition.

As to the epidemiology, the report shows the difficulty of drawing absolutely correct conclusions in the study of a disease like this in which a large number of abortive or missed cases occur. In this epidemic 317 cases were notified, but in only 301 was the diagnosis confirmed. This gives a case rate of 0.57 per 1,000 of the population. The death rate was 0.09 per 1,000, and the case mortality rate 14.9 per cent. Of the cases 58.4 per cent were males and 41.6 per cent were females. The fatality rate, however, was slightly higher among the females than the males, 15.08 per cent as compared with 14.77 per cent. In this small series of cases there seemed to be a greater susceptibility to infection of the central nervous system of males between the ages of 15 and 30—10 deaths among males to 1 of a female in this age period. It was noted that this is the period which represents the maturity and greatest activity of the sexual glands.

No evidence was found that social conditions bear any relation to the incidence of epidemic encephalitis, nor that there is any connection with topographical considerations, the supply of milk, water, or any food.

The report shows that, so far as the Sheffield epidemic is concerned, there is no obvious connection between encephalitis and influenza, if the incidence of the two diseases since 1918 is considered. The year 1924 was not a period of exceptional prevalence of influenza, but the cases of encephalitis reached unprecedented numbers. However, during the 1924 epidemic there did seem to be a real correlation between the two diseases. A chart showing the influenza deaths and the notifications for encephalitis by weeks during the year shows a marked similarity in the two curves. Influenza deaths climb steeply from the middle of January. Encephalitis becomes epidemic 6 weeks later, and reaches its peak 14 days after the influenza peak. From this time on the two curves are approximately parallel, with the encephalitis maxima occurring from one to three weeks behind the influenza maxima.

As a result of this study Wynne concludes that there is no reliable evidence that the disease is spread by direct contact, nor was he able to find any data which would enable him to compute the incubation period if infection occurs.

In the pathological investigation attempts were made to transmit the virus of the disease or its toxins to rabbits and mice, and post-mortem study of bodies dead of the disease and study of specimens of cerebrospinal fluids collected during life were made.

In the attempts to transmit the virus or its toxins to animals, cerebrospinal fluid, emulsions of brain tissue, filtrates of cultures of

washings of the nasal passages, and filtrates of cultures of feces were used. All resulted negatively, as in no case did an animal inoculated with any of these materials show evidence of encephalitis either during life or post-mortem.

The examination of the brains of those dead from the disease (13 autopsies) showed, macroscopically, a slight congestion of the gray matter, and occasionally edema; microscopically there was small-celled infiltration, especially perivascular, in all cases except one. These are the usual findings in cases of epidemic encephalitis.

Cerebrospinal fluid from 36 cases was examined, with the following results:

1. Every specimen was microscopically free from acid-fast and other bacteria, and was shown to be sterile on ordinary cultural examination.
2. In only three cases was there any marked increase in albumen content, and in all of these it could be accounted for by presence of blood. Increase of globulin was also noticeable in these three cases.
3. Every specimen induced reduction of Fehling's solution, but no attempt at a quantitative determination of the reducing agent was made.
4. No positive Wassermann reaction was obtained in any of 31 specimens tested.
5. Cell counts, total and differential, were carried out on 35 specimens, and, excluding those cases in which much blood was present, in nearly every case the number of white cells was below 6 per cubic millimeter. In a few cases the number was increased much above this figure, whilst the differential count showed that the cells present were all, or nearly all, of mononuclear (lymphocyte) type.

In other words, the pathological findings in this epidemic were similar to those reported from other sources.

In the clinical report Hall and Yates show that the primary attack in about one-half of the cases notified could be considered as mild and one-fifth as severe. A preponderance of severe attacks was found in females under 15 years of age. The milder types showed the greater number of complete recoveries, except that Parkinsonism not infrequently followed very mild attacks. The death rate was highest in those with fever and vomiting, and lowest in those whose chief complaint was vertigo. It also was highest in those who suffered acute respiratory disturbances, and was above the average in those who showed severe mental symptoms.

Among the sequelæ it was found that ocular palsies rarely persisted; speech defects were rare; neuralgic pains were a troublesome sequela in one-sixth of the cases in which they occurred; mental disorders persisted in one-half of the cases in which they were present in the acute stage, and at the end of 1925 more cases showed mental disturbance than had shown them from the beginning; sleep disorders tended to persist for long periods; moral changes were not clearly noticed until after the primary attack was over; respiratory disorders did not persist in any cases, but as sequelæ forms of

respiratory disorder were not infrequently associated with nocturnal restlessness and Parkinsonism; Parkinsonism was more common in males than females, and its time of onset was most commonly from 6 to 12 months after the primary attack; the facial mask was the most frequent, and usually the earliest, symptom of Parkinsonism; 64 cases of Parkinsonism have occurred, and of these 5 have already died.

In the discussion of the etiology of epidemic encephalitis Perdrau offers no theory other than that of Levaditi and others, that the virus of this disease is the same as that of herpes febrilis, except for its greater affinity for the central nervous system. He admits that this theory has not been universally accepted by research workers, but states that no other theory has yet been propounded on experimental grounds.

CATARRHAL JAUNDICE

Archives of Pathology and Laboratory Medicine for November, 1926, contains an interesting paper by P. Klemperer, J. A. Killian, and Charles Gordon Heyd on "The Pathology of 'Icterus Catarrhalis.'" In it they attempt to show that catarrhal jaundice is neither a morbid nor a pathologic entity, but may be brought about in several different ways and manifest itself by various pathologic findings. They bring out the fact that the familiar theory that catarrhal jaundice is the result of obstruction and gastroduodenitis does not hold in all cases, as many reported cases show no evidence of gastrointestinal disturbance, while at the same time acute gastroduodenitis is much more frequent than icterus.

Because the clinical picture of mild cases of infectious jaundice resembles so closely that of the common catarrhal jaundice, several writers contend that the two are identical. This has led to considerable bacteriologic research, and many reports of the finding of organisms of the colon-typhoid group in these cases have been made. On the other hand, various searchers have failed to find any organism which might definitely be blamed for the condition. However, as the result of the work of Chauffard and Widal et al., it has been proved that many cases of jaundice are of hematogenous infectious origin.

The various tests for liver function which have been developed in recent years seem to point to a change in the liver parenchyma as the essential feature in many cases of catarrhal jaundice.

The authors report two cases of typical catarrhal jaundice, in both of which the appearance of the icterus was preceded by an attack of articular rheumatism and there was no gastrointestinal disturbance. They consider these cases as of undoubted hematogenous

origin. In one of the cases cholecystogastrostomy was performed, and at the operation small portions of the liver and gall bladder were removed for histologic diagnosis. Study of this tissue led the authors to the conclusion that in this case the icterus was due to rupture of the bile capillaries. Obstructive origin was ruled out by the presence of bile in the gall bladder and intestines. The direct Van den Bergh test pointed to a hepatic origin. The authors, however, recognize the fact that at another stage of the disease the mechanism might have been different.

In conclusion, the writers state that three forms of "icterus catarrhalis" can be differentiated:

1. Icterus due to obstruction of the common duct following gastrointestinal catarrh, true catarrhal jaundice.

2. Icterus due to degeneration and multiple necrosis of the liver, hematogenous in origin.

3. Icterus due to cholangitis, mostly of hematogenous origin.

The etiologic factor of Group 2 is not known; bacterial toxins of various types have to be considered. It is probable that in Group 3 atypic strains of *B. paratyphosus* are of etiologic importance. It is possible that Groups 2 and 3 frequently merge with each other.

The evidence of hepatic derangement in cases of Group 2 suggests careful observation of these cases and dietary regulations in order to prevent further damage to the liver. The history, the presence of urobilin in the urine, and positive results of practically all the liver function tests permit a differentiation from Group 1. Further studies are necessary, however, in order to make a correct differentiation of Groups 2 and 3 possible.

EXCORIATION OF THE SKIN ABOUT INTESTINAL FISTULÆ

Fortunately intestinal fistulæ are rare in naval surgical practice. Occasionally, however, they do occur, either intentionally as a necessary part of some surgical procedure, or accidentally as the result of infection or injury. In connection with the latter class of fistulæ, one of the most troublesome features, both for the patient and the surgeon, is the painful and unsightly excoriation of the skin about the fistula. Methods of preventing this condition are many, but none has been satisfactory. Moist dressings, pastes, ointments, exposure of the skin to sunlight and air, have been tried without success. Always the intestinal juices have worked their way under the dressings and carried on their destructive process unhindered.

As the excoriation of the skin above these fistulæ is due to the action of the enzymes contained in the intestinal secretions, the logical way to prevent it must be by destroying this action. Various writers have shown that the action of the enzymes takes place only when the enzymes are combined with certain substances, known as substrates, and that anything which will prevent this combination will inhibit the action of the enzyme. Substances which possess

this power are, among others, charcoal, kaolin, infusorial earth, alumina, iron hydroxide, colloids, and proteins.

Joseph F. Smith and H. H. Christensen, of Wausau, Wis. (*Surg., Gyne. and Obstet.*, 43: 5,701), report three cases of intestinal fistulæ in which the skin was treated upon this principle with marked success. They found kaolin and charcoal to be the most useful substances for this purpose, as they are cheap and may be used in sufficient quantity to absorb the escaping fluids. Charcoal, however, was rarely used because of its objectionable color.

The method used by these writers was as follows:

Sterilized powdered kaolin, in sufficient quantity to make a thin paste, is mixed with glycerin. This mixture is applied to the body surface about the fistula, forming a close adhesive dressing. Over this a quantity of powdered kaolin is spread to absorb the fluids. This is then covered with the usual dressings.

It has been found that when the discharge is profuse the dressing described will be entirely effective for 5 or 6 hours. Later, when the discharge has become less, two applications in 24 hours are sufficient.

If the skin has already become extensively excoriated the use of this dressing will restore it to a condition which will allow surgical procedure to close the fistula to be carried out.

ETHYLENE ANESTHESIA

Donald Guthrie, in an editorial in *Surgery, Gynecology, and Obstetrics*, November, 1926, calls attention to the marked advantages, from the point of view of safety, of ethylene over other general anesthetics. As he says, chloroform has been practically given up in this country because of its dangers, and ether is no longer considered an ideal anesthetic because of the pulmonary and gastrointestinal complications which so frequently follow its use.

Nitrous oxide and ether are dangerous in the hands of the unskilled, and it does not give sufficient relaxation for abdominal operations in many cases.

Ethylene is safer than nitrous oxide and oxygen, nitrous oxide, oxygen, and ether, or ether alone.

The explosive quality of ethylene has been known from the beginning of its use and has served to frighten many surgeons to such an extent that they will not use it. Much of this fear has been induced by the sensational report of a fatal explosion attributed to ethylene. As a matter of fact, the explosion occurred when nitrous oxide, oxygen, and ether were being used, although it is true that ethylene had been used in the early stages of the operation.

Modern gas machines are so constructed that there is no danger from the static spark that was a menace in the earlier types. It is, however, unsafe to use a cautery or open flame in the operating room while ethylene is being used.

Some operators object to the sweetish odor of ethylene. The patient does not find this disagreeable, and it is not a real drawback to its use.

Among the advantages mentioned are: (1) Ease and quickness of induction of anesthesia; (2) pleasantness; (3) the quick awakening, without postoperative nausea; (4) sufficient relaxation, if local anesthesia is also used; (5) absence of stimulation of the respiratory centers, with consequent naturalness of the sleep induced; (6) dry skin, of normal color; and (7) no excessive secretion of mucus.

Guthrie considers ethylene an ideal anesthetic for the poor surgical risk. It has practically no effect upon blood pressure, hence is especially valuable if shock be present. It is recommended in thyroid surgery because of the quiet respirations and absence of mucus.

Taken all in all, ethylene has obvious advantages over other anesthetics which far outweigh any known disadvantages.

SODOKU IN THE TREATMENT OF GENERAL PARESIS

Much has been written about the treatment of general paresis by the artificial inoculation of the patients with malaria. This method of treatment has become standard in certain institutions in selected cases, and its results have been such as to merit further investigation along this line.

Archives of Internal Medicine (38:3, 391, 1926) contains a preliminary report by H. C. Solomon et al. on the use of sodoku in the treatment of general paralysis. In it the authors report the results of treatment of 12 paretic patients by inoculation with *Spirochaeta morsus-muris*, the etiologic agent of sodoku. (Sodoku is the Japanese name for rat-bite fever.)

Malaria therapy has many disadvantages, among which the authors mention the difficulty with which the organism is kept alive; the severe reactions and a certain mortality; the possibility of inoculating the estivo-autumnal form by accident; the necessity, which usually exists, of inoculating from patient to patient, and the fact that some patients are not susceptible to malaria, while others have only a limited number of paroxysms.

Sodoku (rat-bite fever) has none of these disadvantages. It is a disease which in many ways resembles syphilis in its cutaneous manifestations. Fever develops in from 5 to 15 days, rises to 104–105.5° F. or higher, and is intermittent in type. The disease is

self-limited but extends over a period of several months, is easily cured by arsphenamine, and the mortality is small.

The spirochete of rat-bite fever may be kept alive in laboratory animals without difficulty.

For human inoculations citrated blood from the heart of an infected guinea pig or rat is used. In some of the cases reported the inoculations were made, intradermally, on the anterior surface of the right thigh. Slight lymphatic involvement occurred. Typical attacks of rat-bite fever followed.

During the course of the disease and after the apparent cure by arsphenamine, the blood serum of the patients contained immune bodies which rapidly killed in vitro *Spriochaeta morsus-muris*.

Intravenous inoculation was done in eight cases. Provided none of the blood gets into the skin, no primary sore is produced. Otherwise the course of the disease is the same as that which follows intradermal inoculation.

Malaria does not interfere with the development of sodoku, nor sodoku with that of malaria. Therefore both methods of treatment may be used at different times.

As to the results of this treatment, the authors recognize that it is too early for this to be determined. Also it is yet too early to estimate the true value of malarial treatment. Their results, however, are suggestive of a real therapeutic value of the method.

CARBUNCLES OF THE NECK

No method of treatment of posterior cervical carbuncles yet devised has given universal satisfaction, as is evidenced by the many varying methods in use to-day.

Annals of Surgery, November, 1926, contains an article by Edward M. Livingston, M. D., of New York, entitled "New principles in the surgical treatment of posterior cervical carbuncles." In it the author describes what he considers an ideal operative procedure for the cure of this distressing and frequently dangerous condition. By its use he succeeds in securing immobilization, one of the essentials of a rapid cure. Also, the mortality rate is kept down, and the resulting scar is reduced to a minimum. The author's method is as follows:

- a. An immediate excision of the necrotic tissue is made by means of a double crucial incision, so planned that two lateral sliding flaps are fashioned.
- b. The flaps are elevated by means of vaseline gauze and the wound packed for 24 hours.
- c. The neck is at once immobilized by means of a special plaster of Paris head dressing.
- d. At the end of 24 hours wound is exposed and treated by dry heat.
- e. With the first formation of a granulation base the wound is covered by means of the plastic skin flaps.

f. These flaps are maintained in position by adhesive strips until they have become firmly fixed.

The special plaster of Paris head dressing referred to above is made as follows:

The distance from shoulder tip to shoulder tip over the vertex of the cranium is measured. A molded plaster splint of this length and about 3 inches wide is made. This splint is then applied, running from the acromial end of one clavicle, over the head, to the acromial end of the other. A thick pad of cotton is used under the splint. The splint is held in place by means of a recurrent bandage of the head and figures-of-eight to each shoulder and opposite axilla. After the plaster is dry the figure-of-eight bandages may be removed and strips of adhesive plaster substituted. Windows may be cut for the ears. A loop of gauze or a ring may be made a part of the splint and be used to suspend an electric-light bulb for the application of dry heat.

The author of this paper finds that the splint is easy to apply, does not interfere with the sleep of the patient and is not uncomfortable to the wearer.

In addition to providing complete immobilization of the neck, this dressing possesses other advantages. It relieves the area of all pressure, as loose gauze is applied and held in place by adhesive strips attached to the sides of the splint. The dressing can not slip. There is less muscular strain on the part of the patient, and pain is diminished. Granulation and healing take place quickly.

The use of plastic flaps results in a greatly shortened time required for healing, as by the end of the fourth to sixth day a granulating bed appears and the flaps are approximated at this time. In the average case, according to the writer, all dressings may be dispensed with on the seventh to the tenth day after operation.

GYE'S THEORY OF CANCER

In view of the skepticism with which the announcement by Gye and Barnard, to the effect that they had at last discovered the virus of cancer and that it, together with some accessory substance, was the causative factor in cancer, was received by the medical world, and the strong and growing opposition to the acceptance of the theory, it is interesting to note in the British Medical Journal of November 13, 1926, a summary of the Lloyd Roberts memorial lecture delivered by Gye, in which he reiterates his faith in his theory in these words:

* * * I am satisfied that the simplest explanation of these observations is the correct one—namely, that the agent is a living, filterable microbe, and that it is the cause of new growths.

An editorial in the same issue of the *British Medical Journal* calls attention to the fact that the proof of Gye's theory is indirect and has not been substantiated by experiment. Further, late workers have succeeded in restoring the activity of chloroform-treated extracts by cultures of normal tissues, and the theory, attractive as it is, seems likely to be destroyed by those who oppose it.

\$100,000 OFFERED FOR CONQUEST OF CANCER

Two prizes of \$50,000 each have been offered by William Lawrence Saunders, of New York, for discoveries of the causation, prevention, and cure of cancer. The offer was made on December 15, 1926, and will stand for three years. The donor expects to renew it if necessary.

Mr. Saunders is chairman of the board of directors of the Ingersoll-Rand Co., director of the Federal Reserve Bank of New York, and president of the United Engineering Co.

The decision upon which the awards will be made is to be reached by the American Society for the Control of Cancer and approved by the American Medical Association and the American College of Surgeons.

It is Mr. Saunders's idea that discoveries are not always made by experts and that "through the lure of a reward this serious problem might be solved through the genius of a lay mind, by chemists, or through unorganized medical sources."

Information as to how persons who wish to present their discoveries for consideration should proceed will be announced later.

THE SOFIE A. NORDOFF-JUNG CANCER PRIZE

The Sofie A. Nordoff-Jung prize for the best contribution in cancer research during the past year has been awarded to Dr. Otto Warburg, director of the department of biology of the Kaiser Wilhelm Institute, Berlin-Dahlem. The award was made on the unanimous decision of the commission.

The novel methods of investigation, developed by Professor Warburg, have opened reliable channels for tests on the metabolism of surviving tissues under varying conditions. With a singular predetermination he has made available an abundance of valuable material through comparative experimentations on the processes of disintegration and oxidation of normal tissues and neoplasms. His biochemical attack on the cancer problem presages the most promising results.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,

UNITED STATES NAVAL MEDICAL BULLETIN,

Bureau of Medicine and Surgery, Navy Department,

Washington, D. C.

(For review.)

HUMAN PATHOLOGY, by *Howard T. Karsner, M. D., Professor of Pathology, School of Medicine, Western Reserve University.* J. B. Lippincott Co., Philadelphia, 1926

A book on pathology is usually found dry and uninteresting by most medical men, except where there is a résumé of a case history or an interesting autopsy report. However, here is a book in which pathology is not dead, but a living, interesting subject. The clear, large print and the direct and concise statement of facts are inviting to the reader. One can not help but admire the extensive vocabulary of the author, which is used skillfully to avoid undue verbosity. There is a careful choice of words, with strict attention to their precise meaning; consequently, ambiguity never occurs.

Illustrations serve in many books no other purpose than to vary the monotony of the printed pages. In Karsner's Pathology the illustrations are excellent and really superior in bringing out the details of the subject matter.

The subject is divided into general pathology and systemic pathology. It is presented with a careful consideration for the student or scholar and yet is thorough in every detail. As you read it you think of living pathology instead of the pathology found at autopsy or in the sealed jars on the shelf. It is based on personal experience, balanced by a thorough acquaintance with existing literature on the subject. The conservative interpretations of observations are surprisingly free from personal bias. There is a well-selected bibliography at the end of each chapter. The reader spontaneously sees the illustrations of his clinical experience, gets a new glimpse of the progress of disease, and is impelled to make conclusions which suggest a more rational treatment of patients in the future, for the book throws much light on therapeutics and clinical experience.

The book is one to be read carefully, a little at a time, in order that its effect of stimulating thought may not be missed. Anyone

interested in medicine as a science will value this book and enjoy reading it a second time.

REMINGTON'S PRACTICE OF PHARMACY, Seventh Edition by *E. Fullerton Cook, P. D., Ph. M., Chairman of the Committee of Revision of the Pharmacopœia of the United States of America, etc., and Charles H. LaWall, Ph. M., Pharm. D., Sc. D., F. R. S. A., Dean of Pharmacy and Professor of Theory and Practice of Pharmacy at the Philadelphia College of Pharmacy and Science; Member of the General Committee of Revision, etc.* J. B. Lippincott Co., Philadelphia, 1926

The work is both a practice manual and an encyclopedia. One has come to expect a great deal of Remington's Practice of Pharmacy and the expectations are fully realized in this edition.

The authoritative sections on the national prohibition act, the narcotic act, and the food and drugs act are conveniently presented for the pharmacist and the physician. Commercial law and accounting are treated in an interesting and simple manner.

Part XIII, The Pharmacist in Community Health Service, merits special comment. The elimination of household pests is discussed quite thoroughly and reference is also made to a list of available Government bulletins for those who would go into any special phase of the subject. The four paragraphs devoted to the attitude the pharmacist should adopt toward venereal prophylaxis and treatment clearly define the pharmacist's moral obligation in the premises. The section on disinfection, originally published as "Bulletin No. 42" of the Public Health Service should be of great service to pharmacists and, through them, to the public.

The layman probably has more opportunity and time to talk to the pharmacist than to the doctor. The pharmacist who pays particular attention to the part devoted to biologicals should therefore be in a position to combat the unfortunate prejudice against biological therapy encountered among the uninformed.

The pharmacy, chemistry, and other special sections which have a relation to modern practice of pharmacy and its branches are well worthy of the editors and their eminent collaborators.

The part devoted to toxicology and antidotes is concise and well adapted for reference in emergency. The positive statement is made that the commonly recommended white of egg is of no value in poisoning by bichloride of mercury. We rather think some authorities will take exception to this statement.

LEADERSHIP, A. MANUAL ON CONDUCT AND ADMINISTRATION, by *William Colby Rucker, M. S., M. D., Dr. P. H., Surgeon, United States Public Health Service.* The Macmillan Co., New York, 1926.

Although there have been many articles and books on "leadership" this manual by Surgeon Rucker has a special value to medical officers, whether in the Army, Navy, or Public Health. It discusses

the fundamentals of conduct and administration interpreted by a medical mind. The reasons given in Chapter I for the publication of this book apply equally to all branches of the Government service, although primarily intended for the young officers entering the Public Health Service. The experience of an unusually capable medical officer, attained by long and useful service, has been applied to the problems which he knows the young officer has to solve. There is a kindly philosophy permeating the discussion of the several topics considered to be the basic principles of leadership. A doctor in civilian practice would profit by reading this book, especially the chapters on the basics of character and self-leadership. For medical officers in a military service the chapter on service and public leadership will have a special interest. There is also much in the chapter on "Relations within the service" that is applicable to all the medical departments of the Government.

PHYSIOLOGY AND BIOCHEMISTRY IN MODERN MEDICINE, by J. J. R. MacLeod, M. B., LL. D. (Aberd.), D. Sc. (Tor.), F. R. S., *Professor of Physiology in the University of Toronto; formerly Professor of Physiology in the Western Reserve University, Cleveland.* Assisted by Roy G. Pearce, A. C. Redfield, N. B. Taylor, and J. M. D. Olmsted, and by others. Fifth Edition. The C. V. Mosby Co., St. Louis, 1926.

The need for texts linking the basic medical sciences with the clinic has always been felt. Doctor MacLeod's admirable success in this direction in the case of physiology and biochemistry is indicated by a fifth edition in eight years.

The subject is divided into short chapters, the type is of a comfortable size, and spacing between lines is a little greater than usual. It is surprising how much attention to these details has added to the ease of reading and avoidance of fatigue. Interest is always sustained. There are several introductory chapters on physiochemical phenomena which are perhaps too short to deal adequately with the subject. Some confusion arises from the use of the letter K in chemical formulæ to represent a constant. In the same way the letter B is used to indicate a base in chemical formulæ. Since both letters are symbols for chemical elements, clarity might be enhanced by avoiding such use of those letters.

The author does not have any pet portion of physiology or biochemistry to expound but deals with the entire subject whenever it has any clinical bearing. The nervous system and the special senses are well discussed without excess of technical detail which so often makes this subject inaccessible without time-consuming devotion. Of interest in this connection are the records of photoelectric currents in the human eye, and the discussion of color vision.

The circulation, the factors upon which blood pressure depends, the variations in intracardiac pressure, and other features of clinical

interest having been investigated by instruments of precision, are discussed; the results analyzed, interpreted, and illustrated. The use of electrophonograms in experimental animals to study heart sounds, the relation of the intensity of the sounds to the dynamic state of the heart muscle, and the exact relationship of the sounds to the events of the cardiac cycle help us to understand the human heart at the bedside. The author considers the nerve control of the heart beat in both the cold-blooded heart and the mammalian heart; the nerve control of peripheral resistance and its experimental study; the nerve and hormone control of the vasomotor center, and discusses electrocardiographic studies.

In an equally thorough manner he deals with the subjects of digestion, respiration, metabolism, and excretion.

The perusal of the chapter on insulin reveals the fact that insulin was isolated by Banting and Best, yet there is no hint that the work was done in MacLeod's laboratory and under his guidance.

This book places at the disposal of the clinician well controlled and carefully interpreted observations of fundamental facts in order that he may follow "the scientific method" in his daily work rather than "the empiric method." It stimulates thinking and leads to a more mature judgment in the clinic.

A MANUAL OF PHARMACOLOGY AND ITS APPLICATION TO THERAPEUTICS AND TOXICOLOGY, by *Torald Sollmann, M. D., Professor of Pharmacology and Materia Medica in the School of Medicine of Western Reserve University, Cleveland.* Third Edition. W. B. Saunders Co., Philadelphia, 1926.

Since its first appearance, about 10 years ago, this book has always been an encyclopedia of pharmacologic knowledge. The present edition is in many respects much superior to former ones. The clinician will find at every turn recent information of practical value, much of which can be obtained nowhere else without an unreasonable amount of effort.

Numerous investigators the world over have carried on a voluminous amount of work in experimental pharmacology. Their results are all sifted, compared, and incorporated in the book. The thoroughness and painstaking effort expended in this study is indicated by Appendix C, consisting of 95 pages of references and listing about 5,000 titles.

A healthy skepticism pervades the book, and almost leads one to nihilism in respect to many drugs. There is a tendency to under-value drugs of the symptomatic type, whose method of action is not clear, and to assign results obtained by their use to psychic impression. One feels the need of a closer bridging over of the gap between the pharmacologic laboratory and the clinic.

It is true that frequent instances of considering too many factors may create a tendency toward indecision, yet it can not be denied that they lead to a more cautious and critical use of drugs. As one reads, one is impressed with the fact that drugs are instruments possessing no more intrinsic virtue than the knife, by means of which certain ends may be accomplished; but in order to do so, these instruments must be known, the how and why of their action understood, if one is to act intelligently and avoid a blind routine. The book widens one's horizon, making one cognizant of many useful means to an end.

There is an excellent discussion of the manner of action of war gases and of the treatment of victims of gassing. The section dealing with the effect of drugs on the sympathetic and parasympathetic nervous system is quite intriguing and throws much light on the anatomy and physiology of those systems. Those who have to treat syphilitics will find here a very practical and concise discussion of chemotherapy; of the acquired resistance of parasites to drugs; of the arsenical compounds, their relations, effectiveness, types of reactions and toxic side actions. Of more than passing interest are the discussions of serums, of anaphylaxis and allergic phenomena, of goiter prophylaxis and iodine therapy of toxic goiter, of the theories of narcosis, of the pharmacology of temperature regulation, of osmosis, of physical factors of salt actions, of quinidine in fibrillation of the heart, of digitalis and the digitalis group of drugs, of the ion actions on the heart, and of lead poisoning.

CLINICAL APPLICATIONS OF SUNLIGHT AND ARTIFICIAL RADIATION, by *Edgar Mayer, M. D.* The Williams and Wilkins Co., Baltimore, 1926.

A medical man interested in the clinical application of sunlight and artificial radiation will find this a valuable book. Nothing is left to the imagination. The physical and physiological aspects are well handled. The author's conclusions, from his own experience and the experience of others, are thorough and written in such a way that it is easy to understand and apply them. Many diseases are mentioned, yet tuberculosis is the paramount disease covered.

It is definitely proved that heliotherapy and artificial radiation are the outstanding therapeutic agents of the most value in tuberculosis. It is of extreme interest to the patient to have something upon which to pin his hope of cure. The doctor must have faith properly to guide the patient to better health. To have faith one must have knowledge. Knowledge comes from experience, gained either by one's own successful application or from another who can relate his experience to one. This book contains the results of nine years of experience by the author, a bibliography of 57 pages, and his-

torical data covering 4,000 years. It contains tables and illustrations covering the details of treatment.

The chapters on artificial radiation have to do with the source of light used in therapy, clinical studies of artificial light, the dosage and technique of its clinical use, indications and contraindications for irradiation (sunlight, artificial light, and X-ray therapy), X-ray treatment of tuberculosis, and the influence of light on biochemical reactions.

PRINCIPLES AND PRACTICE OF CHEMOTHERAPY, by *John A. Kolmer, M. D., Dr. P. H., D. Sc. (Hon.), Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania and Member of the Research Institute for Outaneous Medicine.* W. B. Saunders Co., Philadelphia, 1926.

Much has been written about chemotherapy in the past few years, but never before has the whole subject been discussed in one volume, as is done in this mounmental work. Chemotherapy in the minds of most of us has meant the specific treatment by chemicals of a few diseases—malaria, syphilis, trypanosomiasis, and a few others. Kolmer defines it as “the prevention or treatment of disease by chemical disinfection or inhibition of the parasitic causes without marked or serious toxic effects.”

Of the 1,106 pages of this volume, more than 600 treat of syphilis. Other parts discuss the chemotherapy of bacterial and mycotic diseases, trypanosomal diseases, spirochetal diseases other than syphilis, other protozoan and metazoan diseases, and diseases of doubtful origin.

Kolmer recognizes the value of precipitation tests, particularly the Kahn test, as a check on the complement-fixation reactions, but considers them somewhat inferior.

The discussion of the toxicity of the various arsphenamines is complete and valuable, and considerable space is given to the treatment of toxic reactions.

On the whole, this is an extremely valuable book and should be on the shelves of everyone who is called upon to treat syphilis in any of its phases.

THE PRACTICE OF MEDICINE, by *A. A. Stephens, A. M., M. D., Professor of Applied Therapeutics in the University of Pennsylvania; Visiting Physician to Philadelphia General Hospital; Consulting Physician to St. Agnes' Hospital, Philadelphia.* Second edition, entirely reset. W. B. Saunders Co., Philadelphia, 1926.

The first edition of this book appeared in 1922. The second edition, which has been completely reset and reprinted, has been brought up to date, and gives the reader a fair idea of the advances

made in the science of medicine during that time. It is purely a text book and is therefore of more value to the student and busy general practitioner than to the internist who naturally has to seek a more detailed description in the large sets on the subject.

Reference is made to the following subjects that did not appear in the first edition: Primary meningococcic bacteriemia, disseminated erythematous lupus, tularemia, epidemic jaundice in the United States, etiology of scarlet fever, Dick test for determining susceptibility to scarlet fever, coccidioidal granuloma, lipodystrophy, agranulocytic angina, uveoparotid fever, vaso motor rhinitis, occlusion of the coronary arteries, melanuria, Epstein's nephrosis, sickle cell anemia, Ayerza's disease, chronic sclerosing osteitis, acrodynia, and Harner's syndrome. The Kahn test is merely mentioned under the diagnosis of syphilis.

All the subjects of internal medicine, including tropical diseases, are well outlined and written in such a way that one is able to grasp the principal details of the disease. The style of writing, classifications, and phraseology remind the reader of the standard text book on principles of medicine twelve to fifteen years ago, written by the great medical author, Sir William Osler. As Dr. A. A. Stephens, the author of this book, was at one time a pupil of the master clinician, the rightful dedication to him is worthy of being mentioned.

PRINCIPLES OF MEDICAL TREATMENT, by *George Cheever Shattuck, M. D., A. M., Assistant Professor of Tropical Medicine, Harvard Medical School, Junior Visiting Physician, Boston City Hospital; etc.* Sixth edition, revised and enlarged. Harvard University Press, Cambridge, Mass., 1926.

This handy little volume contains in a clear and concise form a statement of the principles of medical practice which must be thoroughly understood in order that treatment may be carried on intelligently. The contributors to its pages are men of high standing in the profession, well qualified to write of their special subjects. In the chapter on medication, Doctor Shattuck gives the mode of action, method of administration, indications and contraindications, and uses of most of the drugs which are extensively employed. He is evidently a believer in the use of a few good drugs instead of a large number tried at random, and gives a list of 11 drugs which he considers very valuable. These are arsphenamines, mercurials, iodides, diphtheria antitoxin, opium and its derivatives, digitalis and other heart tonics, nitroglycerin and nitrates, magnesium sulphate and other purgatives, salts of quinine, salicylates, and insulin.

Any naval medical officer will find this small book a valuable aid in refreshing his memory of diseases and their treatment in general and for quick reference in connection with specific cases.

THERAPEUTICS, MATERIA MEDICA, AND PHARMACY, by *Sam'l O. L. Potter, A. M., M. D., M. R. C. P. Lond., Formerly Professor of the Principles and Practice of Medicine in the Cooper Medical College of San Francisco, etc.* Revised by *R. J. E. Scott, M. A., B. C. L., M. D., Fellow of the New York Academy of Medicine, etc.* Fourteenth edition. P. Blakiston's Son & Co., Philadelphia, 1926.

Like its previous editions, this book should prove very valuable to the student and practitioner. The subjects are treated concisely but completely.

Part I, devoted to *Materia Medica* and Therapeutics, is written in an interesting style. Physiological action and the therapeutics of the principal drugs are discussed clearly and the text is unencumbered by unimportant details.

Part II, Pharmacy and Prescription Writing, reviews the classes of preparations in the current Pharmacopœia, touches on weights and measures, and discusses briefly the procedure of correct prescription writing.

Part III deals with special therapeutics and contains, in addition to the author's observations, a painstaking compilation of the therapeutic preferences of eminent authorities which affords a comprehensive means of reference.

RECENT ADVANCES IN BIOCHEMISTRY, by *John Pryde, B. Sc. (St. And.), M. Sc. (Wales), Lecturer in Physiological Chemistry, Welsh National School of Medicine, University of Wales.* Blakiston's Son & Co., Philadelphia, 1926.

This book offers nothing new that will not be found in larger late editions on the subject. It is a small book, well written and easy to read. Its value in a medical library would be as an up-to-date supplement to a more complete book on biochemistry.

It does cover the advances in biochemistry, except the mechanism of tissue oxidation and the chemistry of internal secretions. These have been omitted, due to the inconclusiveness of our present knowledge.

The chapters on vitamins, chemical basis of specific immunological reactions, and chemotherapy are very instructive and interesting to the reader. It gives a definite idea of the proved chemotherapeutic substances, when and how to use them.

EXPERIMENTAL PHARMACOLOGY AS A BASIS FOR THERAPEUTICS, by *Dr. Hans H. Meyer, Professor of Pharmacology, University of Vienna, and Dr. R. Gottlieb, late Professor of Pharmacology, University of Heidelberg.* Second edition in English translated by *Velyien E. Henderson, Professor of Pharmacology, University of Toronto*, from the seventh revised German edition. J. B. Lippincott Co., Philadelphia, 1926.

In this book drugs are not discussed according to their botanical or chemical classification, but, as stated in the translator's preface,

"the authors approach their subject from the physiology of each organ and its pathological conditions, striving to show how its functions may be altered by exhibition of remedial agents."

A vast amount of detail is presented in clear, coherent style. The source of practically every positive statement made in the book is given in the exhaustive bibliography. There are numerous illustrations, diagrams, and valuable tables. Structural chemical formulæ are given for nearly all the more complex drugs. Much recent work of proved value is incorporated in this text. Pyramidon, butyn, stovarsol, and yatren are among the newer drugs mentioned. Ethylene in anesthesia and carbon tetrachloride treatment in hookworm infection also receive consideration. The chapter entitled "Pharmacological actions on the causes of disease," deserves special mention as an excellent scientific discussion of antiseptics, anthelmintics, and the so-called "specific" drugs used in the treatment of malaria, syphilis, and trypanosomiasis.

We have in this work a very complete and satisfactory correlation of physiology and pharmacology, presented from the clinician's viewpoint.

PRINCIPLES AND PRACTICE OF ORAL SURGERY, by *S. L. Silverman, D. D. S., F. A. C. D., Clinical Professor of Oral Surgery, Atlanta-Southern Dental College; Associate Professor of Surgery (Oral) Emory University, School of Medicine, etc.* P. Blakiston's Son & Co., Philadelphia, 1928.

This is a very good book for students, with much to recommend it in clearness of style and practical suggestions.

Since it is designed for students, it is of great importance that their early indoctrination be correct. Few things are more difficult to change than basic beliefs which are erroneous. So the reviewer feels obliged to take issue with the author in certain of his statements.

On Page 57 we find: "In carcinoma we have an early involvement of the lymphatics and a tendency to metastasis; consequently block dissection of the neck is absolutely imperative." One who makes the rounds of the large cancer clinics of the country will find that block dissections are being done with less frequency every year, because: (a) Less than 2 per cent of these growths metastasize below the neck, since the cervical glands form an effective barrier against metastasis. This barrier should not be removed. (b) An anatomically complete dissection of this region is an operation of the first magnitude, not to be done by the occasional operator. Most of those done, even by skilled surgeons, are woefully incomplete. (c) There is statistical evidence that block dissection is a very unreliable bar to extension of the growth. (d) Radium treatment of the glands that become the seat of metastasis has proved far more effective than

removal of the glands. If there is anything in surgery that is "absolutely imperative," it is not block dissection.

On page 61 the author states "the treatment in carcinoma should at no time be conservative," and total resection of the jaw is recommended without distinction as to the type or location of the lesion. In this statement and in his failure to mention radium or the electrothermic methods of treating cancer, he shows himself to be out of touch with modern methods of cancer treatment. We strongly recommend a visit to the Memorial Hospital, New York, to observe the splendid work being done there in conservative treatment of intraoral cancer, or a few days at the William L. Clark Hospital in Philadelphia.

Another weakness lies in the attempt to describe the technic of major operations, such as total resection of the mandible and resection of the tongue, in a few lines. It would seem that the space so employed could be better used in devoting more attention to the indications for doing each operation.

In discussing cleft-palate operations the author shows that he belongs body and soul to the Brophy school. Nonconformists and dissenters therefrom receive scant consideration. This may do for students, but practioners would probably like to hear both sides.

PRACTICAL SURGERY OF THE JOSEPH PRICE HOSPITAL, by *James William Kennedy, M. D., F. A. C. S., Surgeon to the Joseph Price Hospital, Philadelphia; Consulting Surgeon to the Norristown, Coatesville, and Chambersburg Hospitals, etc.* F. A. Davis Co., Philadelphia, 1926.

To one who was familiar with the medical Philadelphia of 25 years ago, the name of Dr. Joseph Price brings back many memories—memories of an old house converted into a hospital; of a pine kitchen table adapted for use as an operating table; of a tablespoon used for a retractor; of a white-haired man who stated radical ideas in a most forceful and dogmatic manner as he worked; of a man who did not believe in writing for publication, but whose hospital in a poor section of the city was the Mecca for visiting physicians from far and wide.

From the hospital named for Doctor Price comes this book, written by one of his students and loyal admirers. It is a most refreshing book to read, highly individual in its treatment of many aspects of diagnosis and technic. The author states that he has not reviewed the literature and he evidently is little influenced by the opinions of those who differ with him. He holds many views which are widely variant from those held by most surgeons and he defends them with most vigorous arguments which are based on a wide experience. Throughout the book he gives credit to his distinguished teacher, Doctor Price, for originating many of the

ideas and methods that are the fundamentals of the surgery of to-day.

Whoever reads this book will find many things with which he will strongly disagree and he will thereby be stimulated and benefited. He will also find a wealth of valuable and practical information which it would be hard to find in any other book on surgery and gynecology.

CLINICAL SURGICAL DIAGNOSIS, by *F. de Quervain, Professor of Surgery and Director of the Surgical Clinic at the University of Berne*. Translated by *J. Snowman, M. D.* Fourth English edition. William Wood & Co., New York, 1926.

This is a translation of the ninth German edition, in advance of the publication of the original. English readers thus have the privilege of being the first to learn the most recent surgical views of the distinguished author.

It is difficult to select for special comment any particular chapter of the book because of the generally high level of excellence. But the reviewer is especially impressed with the sections on abdominal injuries, intestinal obstruction, surgical diseases of the urinary organs, and injuries of the spinal column.

Some of the most valuable parts of the book are those in which the author steps outside the field indicated by the title and discusses operative indications. One wishes that he would do so more frequently. It is emphasized again and again that our aim is not diagnosis but cure. He repeatedly demonstrates that clinical training still dominates the province of surgical practice and that the function of the laboratory worker can not replace that of the clinician.

THE DUODENAL TUBE AND ITS POSSIBILITIES, by *Max Einhorn, M. D., Professor of Medicine at the New York Postgraduate Medical School; Visiting Physician to the Lenox Hill Hospital, New York*. Second edition, revised and enlarged. F. A. Davis Co., Philadelphia, 1926.

A most interesting study of the history, diagnostic and therapeutic use, and the limitations of the duodenal tube.

The last two chapters describe certain of the author's very ingenious instruments and the methods of their use. There are the pyloric dilator, the infantile dilating pyloric catheter, the pyloric dilator with diaphane and aspirator, the double balloon pyloric dilator, the duodenal obturator, the intestinal delineator, and others. He states that while some of these instruments have, at present, a mere theoretical value, most of them have already shown their practical use and worth.

The internist and diagnostician can hardly fail to get many new and useful ideas by reading this book.

CAVERNOUS SINUS THROMBOPHLEBITIS and Allied Septic and Traumatic Lesions of the Basal Venous Sinuses, by *Wells P. Eagleton, M. D., Newark, N. J., Medical Director, Newark Eye and Ear Infirmary; Chief of the Division of Head Surgery, Newark City Hospital, etc.* The Macmillan Co., New York, 1926.

This is a most exhaustive monograph by one who has seen an unusual number of cases of sinus thrombophlebitis. The author has carefully observed his cases and thoroughly studied his subject. His observations, conclusions, and recommendations are deserving of study by surgeons, neurologists, and specialists in the eye and ear.

Great importance is attached to the necessity for early diagnosis so that surgical attack may have some chance of success. Many cases are described in which the classical manifestations of exophthalmos were absent and the signs by which such slowly developing cases can be recognized are fully discussed. The proper surgical treatment is described and much emphasis is laid on the importance of ligation of the common or internal carotid, in addition to drainage.

MODERN CLINICAL SYPHILOLOGY, by *John H. Stokes, M. D., Professor of Dermatology and Syphilology in the School of Medicine, University of Pennsylvania; Professor in the Graduate School of Medicine, University of Pennsylvania; etc.* W. B. Saunders Co., Philadelphia, 1926.

Doctor Stokes, an authority on the subject of which this book treats, has produced a book which contains in one volume about all that student or practitioner need know in regard to syphilis in order that he may be competent to treat his patients satisfactorily. The author's experience as a teacher has caused him to be dogmatic in many statements; which fact increases, rather than lessens, the value of the book.

The value of laboratory procedures in diagnosis is placed by Stokes at 60 per cent; 40 per cent depends upon careful physical examination. He prefers the Kolmer modification of the Wassermann reaction and dismisses the precipitation tests, including the Kahn reaction, with few words. Many case reports are made use of for purposes of instruction and the illustrations are numerous and excellent.

Everyone who treats syphilitics will want this book for study and reference.

PRACTICAL MATERIA MEDICA AND PRESCRIPTION WRITING by *Oscar W. Bethea, M. D., Ph. G., F. C. S., Professor of Clinical Therapeutics, Tulane School of Medicine; Professor of Therapeutics, Tulane Graduate School of Medicine; etc.* Fourth revised edition. F. A. Davis Co., Philadelphia, 1926.

Part I contains the usual alphabetical list of drugs in general use, with a description of their therapeutic action, uses, toxicology, and

methods of administration. In addition, a large number of correctly written prescriptions are given.

Part II treats of prescription writing and goes into the subject very fully. The author considers the correct use of medical Latin as very important and also easy to learn.

Part III gives a number of prescriptions which illustrate the common errors made in prescription writing, together with the same prescriptions in their correct form.

In the appendix numerous problems and blackboard exercises which have been found of use in teaching the subject are given.

In this fourth revised edition, the text has been made to conform to the U. S. P. X. Many drugs not included in this revision of the Pharmacopœia have been omitted from the book, though some are retained, as they are still in general use.

HYDROGEN ION CONCENTRATION, Volume I, PRINCIPLES OF THE THEORY, by *Leonor Michaelis, M. D., Professor in the University of Berlin; Resident Lecturer in Research Medicine in Johns Hopkins University*. Authorized translation from the second revised and enlarged German edition, by *William A. Perlzweig, M. A., Ph. D., Associate in Medicine and Chemistry to the Medical Clinic in Johns Hopkins University and Hospital*. The Williams & Wilkins Co., Baltimore, 1926.

This book is extremely technical and requires a good knowledge of chemistry to be able to follow it and understand the formulas. The subject is one that has been taken up several times and laid aside by the profession in the past two decades. Now it appears to have come to stay, for the subject of physical chemistry must have its proper recognition pertaining to physiology.

The first part deals with the chemical equilibrium of the ion, starting with the law of mass action in the simplest possible way. The remaining four chapters lead one through the subject step by step, so that one is able to follow if each chapter is mastered as it is read.

The second part deals with the ions, particularly the hydrogen ions, as sources of electrical potential differences. At this phase of the subject you begin to realize its real application to the profession. The author takes up the physiological significance of diffusion potentials, potentials at phase boundaries, membrane potentials, and absorption potentials.

It is a textbook covering the theoretical physico-chemical principles and no doubt an excellent forerunner to the following volumes dealing with methodology and the colloid-chemical, physiological, and medical applications.

Physical chemistry is attaining more importance in physiology, and a book of this character is necessary to an understanding of the underlying principles that allow us to treat the subject in a scien-

tific manner. While our knowledge is vague at present, a broader opening is in store for the future, and this book gives an excellent foundation.

AN INTRODUCTION TO THE PRACTICE OF PREVENTIVE MEDICINE, by *J. G. Fitzgerald, M. D., LL. D., F. R. C. S., Professor of Hygiene and Preventive Medicine and Director, School of Hygiene and Connaught Laboratories, University of Toronto.* Second edition. The C. V. Mosby Co., St. Louis, 1926.

In the compilation of this useful textbook, the author has had the assistance of various authorities on the subjects with which it deals. They have succeeded in bringing together in a very readable form the knowledge which is essential as a starting point for the further pursuit of this increasingly valuable science. As the author is professor in a Canadian school, naturally many of his illustrations are from Canadian sources. The United States is freely drawn upon, however, and the book will be just as valuable for the students of one country as the other.

A TEXTBOOK OF PHARMACOGNOSY, by *Heber W. Youngken, A. M., Phm. M., Ph. D., Professor of Pharmacognosy and Materia Medica in the Massachusetts College of Pharmacy, Boston; Member of the Committee of Revision of the Pharmacopœia, etc.* Second edition, revised and enlarged. P. Blakiston's Son & Co., Philadelphia, 1926.

The book is attractive, well written, and nicely illustrated. The historical section is interesting and reminds us that papyri of the Egyptians, written as early as 1600 B. C., record the names of many drugs of that period which are included in the present-day materia medica, including acacia, myrrh, cannabis, opium, aloe, etc.

While the publication is of special interest to the professional and commercial pharmacognosist, it will appeal to those of the service in foreign lands who wish to acquaint themselves with medicinal plants in their natural habitat.

AN INTRODUCTION TO BIOLOGY, by *Alfred C. Kinsey, Sc. D., Associate Professor of Zoology, and Waterman Research Associate, Indiana University.* J. B. Lippincott Co., Philadelphia, 1926.

Just what its title claims, this is an introduction to biology, written for high-school students, by one who knows how to present his subject so that its study will be a pleasure instead of a task.

Although intended to be only a textbook for beginners, the book is so complete that medical men, all of whom already have some knowledge of biology, will find themselves well repaid by its careful perusal.

The illustrations are plentiful and excellent, the type and paper are good, and the text has been well edited.

DISEASES OF WOMEN, by *Harry Sturgeon Crossen, M. D., F. A. C. S., Professor of Clinical Gynecology, Washington University Medical School, and Gynecologist in Chief to the Barnes Hospital and the Washington University Dispensary; Fellow of the American Gynecological Society and of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, etc.* Sixth edition, revised and enlarged. C. V. Mosby Co., St. Louis, 1926.

By the time a book reaches its sixth edition it is so firmly established that it requires no extended review.

It suffices to say that this edition maintains the high standard of its predecessors. Its completeness and the practical way in which the subject is presented give ample reason for the continued popularity of the work.

PRACTICAL DIETETICS IN HEALTH AND DISEASE, by *Sanford Blum, A. B., M. S., M. D., Head of Department of Pediatrics and Director of the Research Laboratory, San Francisco Polyclinic and Post Graduate School.* Second revised edition. F. A. Davis Co., Philadelphia, 1926.

This work has as its purpose the elimination of the time required for the preparation of individual diet lists. The author, without going into any discussion of the dietary needs of different conditions, gives dietary lists for disease in various types of patients—as for example: “Anemia, malnutrition, society woman. Condition caused by repeated dietetic errors.”

The result is a mass of “lists which can readily be modified to meet the needs of the individual case.” At once, it would seem, the author defeats the avowed purpose of the work. The author mentions insulin in his introduction only to disregard it under the heading of diabetes, which section is not entirely up to date. The work is not without value but it does fail to stand out among others of its kind.

A MANUAL OF HYGIENE AND SANITATION, by *Seneca Egbert, A. M., M. D., Dr. P. H., Professor of Hygiene, University of Pennsylvania; etc.* Eighth edition. Lea and Febiger, Philadelphia, 1926.

The eighth edition of Egbert's manual differs from its predecessors in that it has been thoroughly revised to include the best of present-day knowledge covering hygiene and sanitation. It is of interest to note that the chapter on military hygiene has been replaced by one on tourist and vacation hygiene and camp sanitation. The automobile tour has become so common a pastime, and tourists who spend much of their time on the road or in camp are so numerous, that the author rightly considers it important that knowledge of how to camp with safety to all should be widespread. Of course, much that he has to say in this chapter applies equally to military camps.

The book is in no sense a treatise on hygiene in all its phases, but is an excellent manual and serves a very useful purpose.

THE DIABETIC LIFE, ITS CONTROL BY DIET AND INSULIN, by *R. D. Lawrence, M. A., M. D., Chemical Pathologist and Lecturer in Chemical Pathology, King's College Hospital*. Second edition. P. Blakiston's Son & Co., Philadelphia, 1926.

Of all the books written for use both by the patient with diabetes and the physician treating him, this seems to the reviewer to be the most nearly satisfactory one that has come to his attention. It gives all the usual facts which a diabetic patient need know to enable him to lead a fairly normal life and, in addition, simplifies the diet question to a point where it may be solved by any intelligent person. If it be followed, the necessity for hospital treatment of diabetics will be reduced to minimum.

HAY FEVER AND ASTHMA, by *Ray M. Balyeat, A. M., M. D., Instructor in Medicine in the University of Oklahoma Medical School; Director of the Oklahoma Asthma and Hay-Fever Clinic, Oklahoma City, etc.* F. A. Davis Co., Philadelphia, 1926.

This is another of the manuals written for the patient and his physician. Its author stresses the fact that hay fever and asthma are local problems and can usually be controlled by finding and removing the local cause. Enough is said to enable the patient to understand his condition and to cooperate better with his physician. The book should prove valuable to the sufferer from the conditions of which it treats.

THE NORMAL CHILD, by *B. Sachs, M. D., New York*. Paul B. Hoeber (Inc.), New York, 1926.

In this fascinating little volume, the author gives excellent advice to parents, teachers, doctors, and others who have to do with the care of children, upon how to keep the normal child normal in mind and morals. It will repay its reader well for the slight effort required to familiarize himself with it.

Doctor Sachs, after stating that every member of a community must share in the responsibility for developing useful men and women, calls attention to the great responsibility that rests upon the doctor.

Blaming failure upon heredity, the author considers only an excuse for inefficient parental care.

Much of the book is devoted to a refutation of the theory of Freud and his followers, that all thoughts and actions, even in earliest infancy, are based upon the sex instinct. His advice to disregard the fact that infants have sex instincts is good. Psychoanalysis means to him only the attempt to find the sexual factor and he considers it a dangerous instrument. He ridicules Freud's interpretation of dreams

and believes that the interpretations are largely the expression of the interpreter's libido. In his opinion, much harm has been done by this "pseudo-science."

Any doctor not himself a devoted disciple of Freud, may read this book with profit and may safely recommend it to parents of young children.

CONTRIBUTIONS TO OPHTHALMIC SCIENCE, edited by *William H. Crisp* and *William C. Finnoff*. George Banta Publishing Co., Menasha, Wis., 1926

This is a volume of valuable papers upon various subjects connected with the science of ophthalmology, contributed by the recognized leaders in this science in the United States. It was compiled to honor Dr. Edward Jackson, and is dedicated to him upon the occasion of his seventieth birthday. In addition to its worth as a well-deserved tribute to a master, it contains much of interest and value to all who practice ophthalmology.

THE OPHTHALMIC YEAR BOOK, Volume XXII, edited by *William H. Crisp*, Ophthalmic Publishing Co., Chicago, September, 1926.

It is difficult to see how anyone practicing ophthalmology can get along without this series of books. The present volume contains references to and digests of the literature of this subject for 1925, arranged in such a way as to be of great value to all specialists in diseases of the eye, and especially so to anyone engaged in the preparation of papers dealing with these conditions.

INTERNATIONAL CLINICS, edited by *Henry W. Cattell, A. M., M. D.*, Volumes III and IV. Thirty-sixth series. The J. B. Lippincott Co., Philadelphia, 1926.

In Volume III, the section given to diagnosis and treatment contains 13 papers of interest. One by Louis F. Bishop, of New York, describes a group of seven people he has observed for 10 years or longer, after they have attained a blood pressure of 200 or more. All are living comfortable and fairly normal lives. Doctor Bishop attributes this to "exercise and diet and castor oil." He teaches his patients to disregard "the arithmetic of their blood pressure and to avoid having it frequently measured."

L. Pierce Clark contributes a valuable paper on discharge convulsions. Though his association with Randalls Island Hospital and the Craig colony for epileptics he has a wealth of material upon which to draw.

An interesting account of European medicine and medical education, with special reference to conditions in Italy, is given.

The volume closes with a biographical sketch of the late Sir Clifford Allbutt by Sir Humphrey Rolleston.

Volume IV contains numerous valuable articles. One by Barker on hepatic cirrhosis is of special interest. "Prognosis in functional

heart disease," by James J. Walsh, tells the story of the writer's experience of 40 years in caring for patients with premature systole. Other papers deal with surgical conditions, epidemic diseases, and a wide variety of subjects.

THE MEDICAL CLINICS OF NORTH AMERICA, Vol. 10, No. 3; November, 1926. W. B. Saunders Co., Philadelphia

This is a Mayo Clinic number of this valuable periodical. As is always the case with these books, this number contains reports and discussions of many interesting cases.

Rowntree and Snell discuss the diagnosis and treatment of certain glandular deficiencies and conclude that polyglandular therapy is unscientific and that gland transplantation, in their experience, is valueless.

Vinson and Lemon call attention to the limitations in the use of lipiodol in the diagnosis of lung diseases and stress the importance of a thorough bronchoscopic examination prior to its use.

A paper of considerable value, by Hench and Jepson, deals with the differential diagnosis of different forms of chronic arthritis. Modern treatment of this condition is also discussed.

Alvarez introduces a new sign of tabes—a relaxed rectum. Although found in a few other condition, when present, tabes should be suspected.

Other papers, too numerous to mention by title, treat of various medical conditions met with in the Mayo Clinic.

THE DIVISION OF PREVENTIVE MEDICINE

Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

TOTAL FUEL REQUIREMENT IN HEALTH

By J. R. PHELPS, Commander, Medical Corps, United States Navy

The total fuel value of the food required by a healthy adult to maintain normal weight must be great enough to—

- (a) Fulfill the requirements of basal metabolism, and
- (b) Provide the necessary additional calories for muscular work.
- (c) Furnish heat when the body is subjected to environmental cold and sufficient heat to maintain normal temperature, if not already being produced either as the result of the specific dynamic action of food in process of assimilation or as the result of muscular work performed for some other purpose than merely to keep the body warm.

The total fuel requirement varies for different individuals even if they happen to be of about the same height and weight. While basal metabolism may be about the same, the energy developed in muscular work is likely to vary a great deal. Therefore the minimum quantity of food required to prevent loss of body weight is essentially a personal rather than a group problem. The number of calories required will depend upon a number of variables, including age and body mass, glandular activity, specific dynamic action of protein and carbohydrate ingested, weather conditions, the clothing worn, and the total amount of energy released in work, play, etc. It may be impossible to predict what the resultant effect of these variables will be with respect to quantity of fuel required by a given individual.

On the other hand, average requirements may be calculated with reasonable accuracy by studying groups of individuals. The statistical method may be employed to determine the average fuel value of food consumed by many persons in different occupational groups.

Voit followed this method in Germany and Atwater and others, in a similar manner, collected much valuable information regarding the quantity and variety of foods consumed by persons in different circumstances in the United States. Chittenden approached the problem from a different angle. He placed groups of individuals on prescribed diets and studied the effects. His conclusions regarding total fuel values required under varying conditions of work and exercise were not strikingly different from those of other observers. He proved to his own satisfaction and convinced many other students that diets such as those recommended by Voit, Atwater, Langworthy, and others on the basis of statistical dietary studies contained harmful and unnecessarily great amounts of protein. His opinions will be considered in discussing the protein requirement.

When Chittenden drew his conclusions it was not appreciated as it is now that proteins differ greatly in biological value. Who can say what the *optimum* amount of protein is? If the growth-promoting qualities of the proteins eaten are of the highest a smaller total amount of protein will undoubtedly suffice than if the mixture ingested contains proteins of less value for the growth and repair of tissues. Moreover, the extent to which proteins can be advantageously utilized, like fats and carbohydrates, as fuel for work and heat, without harm to the organism, has not really been established.

Who can say what the *optimum* quantity of food is for a given person? The total fuel value required will obviously depend upon conditions that can only roughly be predetermined. If an individual is obviously overweight, the inference is, that he is eating more food than is good for him. But some other individual who is smaller and thinner and apparently not expending any more energy in work may be eating more without putting on weight. If the excess of food beyond requirements is burned and not stored, is the individual harmed in any way by ingesting such excess? If the answer to this question is to be found in the literature it has been overlooked. The problems of undernutrition and dietary deficiencies loom up in public-health work quite as much as the consequences of overnutrition.

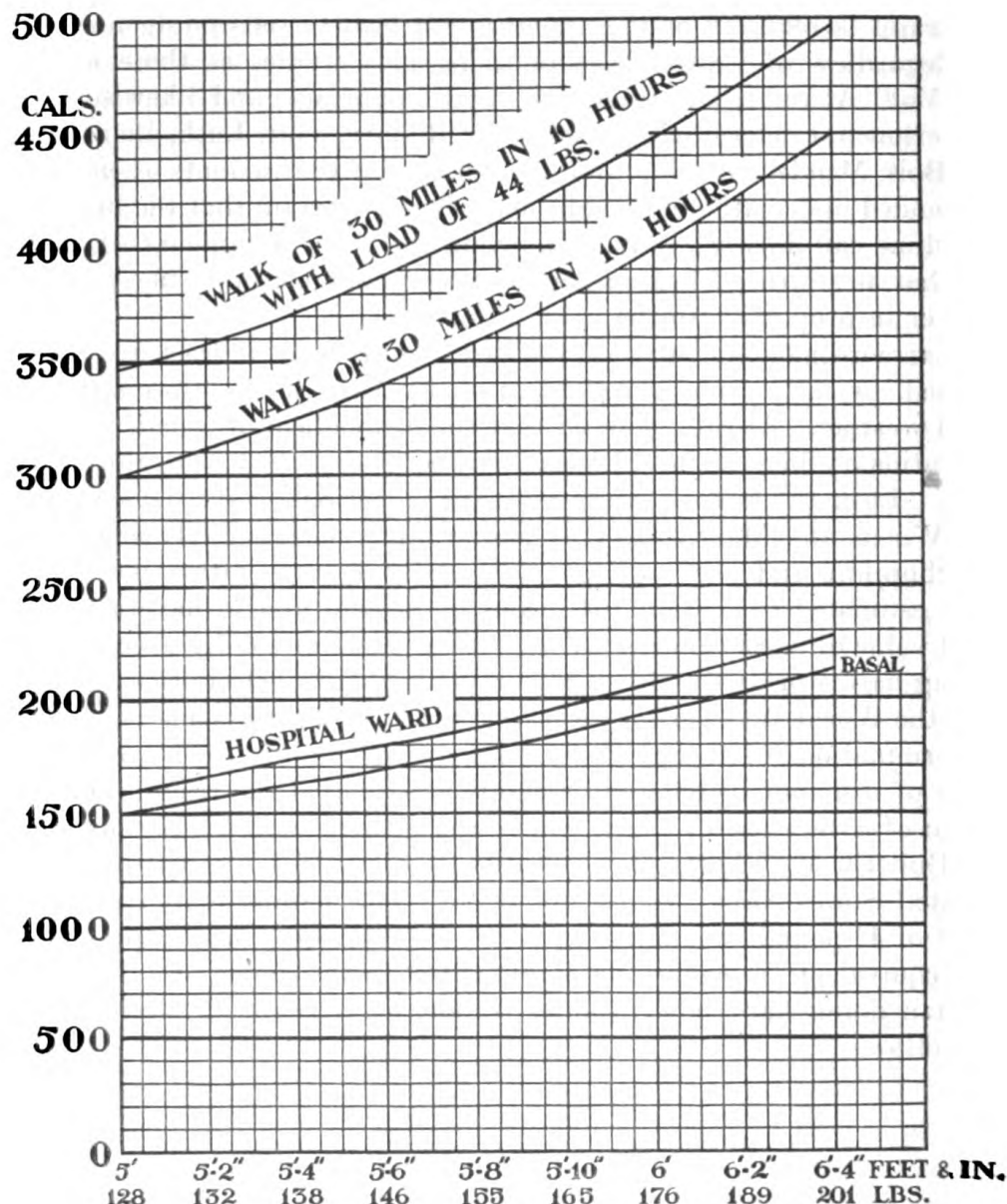
Another question that arises is, To what extent can appetite or hunger sensations be relied upon to indicate the proper amount of food to be ingested? Appetite leads certain individuals to become obese, but, in general, it is reasonable to suppose that evolutionary adjustments incidental to survival of the fit have made the average or representative or race appetite a quite accurate measure of optimum fuel requirements as well as requirements respecting various.

separate essential dietary factors. According to supporters of the Chittenden viewpoint, with an abundance of food available, self-restraint is required or the appetite will lead to self-indulgence.

Regardless of Chittenden's findings, such studies as those made by Voit, Atwater, and others are very important, and likewise the experimental determinations made by Rubner, Voit, Lusk, Benedict, DuBois, Mendel, Osborne, and many others of the amounts of energy expended under different conditions. It is as certain that the human machine can do work only by burning the requisite amount of fuel as that any form of heat engine or motor must consume fuel or use power in proportion to the work output.

Extraordinary amounts of fuel are required, or at least are consumed, by men performing exceptionally hard labor, especially in cold weather. Atwater showed that the metabolism of a man riding a stationary bicycle for 16 hours was equivalent to 9,300 calories a day. Lusk refers to a study covering a period of six days made by Woods and Mansfield of 50 Maine lumbermen actively engaged in chopping and yarding logs. The daily average ration per man was estimated to contain 164 grams of protein and to have a total fuel value of 8,083 calories. The average sailor or soldier even when doing hard work will seldom require more than 5,000 calories. During the World War DuBois, working with Lusk, made some valuable determinations of fuel needs under varying conditions of work for men of different heights and weights and plotted the results in the form of a very useful chart, which was printed with his permission in Bulletin 39, "Notes on preventive medicine for medical officers, United States Navy, August 23, 1918." The 30-mile march with a load of 44 pounds was taken as a type energy requirement representing equivalent mechanical accomplishment in the course of a day for a man doing hard labor, soldier, sailor, or civilian. The chart is as follows:

CHART BASED ON THE DuBOIS ESTIMATIONS OF FUEL REQUIREMENTS OF MEN OF DIFFERENT HEIGHTS AND WEIGHTS ACCORDING TO WORK PERFORMED



Factors commonly used in the United States in computing dietary needs, based partly upon experimental data and partly upon arbitrary assumptions, were given by Atwater as follows:

Man at hard muscular work requires 1.2 the food of a man at moderately active muscular work.

Man at light muscular work and boy 15 to 16 years old require 0.9 the food of a moderately active man.

Man at sedentary occupation, woman at moderately active work, boy 13 to 14, and girl 15 to 16 years old require 0.8 the food of a moderately active man.

Woman at light work, boy 12, and girl 13 to 14 years old require 0.7 the food of a moderately active man.

Boy 10 to 11 and girl 10 to 12 years old require 0.6 the food of a moderately active man.

Child 6 to 9 years old requires 0.5 the food of a moderately active man.

Child 2 to 5 years old requires 0.4 the food of a moderately active man.

Child under 2 years requires 0.3 the food of a moderately active man.

These factors, at best, furnish a very rough measure of fuel requirements. When they came into use little special consideration had been given to the needs of growing children. In most cases children require more food (fuel) per pound of body weight than a man at moderately active muscular work, and the total 24-hour requirement may actually be greater. Mendel, in his book *Nutrition: The Chemistry of Life*, 1923, pointed out that one of the most significant features of calorimetry studies has been the relatively high basal metabolism of adolescent children. DuBois has shown that the rate of basal metabolism for boys 10 to 12 years of age is about 25 per cent greater than for men. According to Benedict, after boys and girls reach 75 pounds of body weight the rate of basal metabolism is about the same, and later, to maturity, the rate may be higher for a girl.

Total fuel requirements of children.—From 1911 to 1919, Benedict, aided by the cooperation and judgment of Dr. Fritz Talbot, of Boston, carried on a laborious and intensive study of metabolism among children of different ages. The results were reported in a paper entitled, "Energy requirements of children from birth to puberty," read as the Shattuck lecture before the Massachusetts Medical Society at Boston, June 3, 1919, and published in the *Boston Medical and Surgical Journal*, July 31, 1919.

As might be expected by a statistician given to careful analysis, it was a matter of considerable difficulty to establish normal weights for children. Benedict opined that if we are to have better babies and better children, dietitians, physicians, and mothers must disregard entirely the misleading averages and strive for a condition of nutrition measurably better than that indicated by the so-called average or normal line. He reasoned that if medico-actuarial in-

vestigations make it probable that the expectation of life is greater for young men and women who are overweight as compared with average weight, it is logical to infer that overweight with children is advantageous. In commenting upon the findings, which were presented in detail, Benedict remarked that basal metabolism is of fundamental interest and, with youth at least basal metabolism may be safely compared to that found with the subject asleep. With a child in bed, resting but awake, the increase in metabolism will depend entirely upon the activity. He noted in his study that severe crying increased the metabolism of very young infants 63 per cent on the average, with a possibility of 200 per cent increase. He continued:

Basal needs are inevitable and represent a never ceasing 24-hour demand, which is, so to speak, an irreducible minimum. To supply only the minimum demand for calories would leave the normal child at the end of the day with a large deficit, for the 24-hour demand of the child is made up of minimum or basal demands plus the varying extra demands which are due to several causes. First, food in the alimentary tract of itself stimulates heat production. Energy is further needed to supply the material for growth. Finally, extra energy is needed for both unproductive and productive muscular activity. If the boy shovels snow, fuel must be supplied to the animal engine for this work. The girl who sweeps or dusts a room needs, as the Nutrition Laboratory has recently shown, approximately 150 per cent more energy while she is at work than when she is sitting quiet. This factor of the extra energy needs above the basal minimum is one of the great variability, most difficult to estimate, and probably much larger than commonly believed.

Everyone will admit that the growing, active boy is a great consumer of food. The popular impression as to the amounts of food so consumed, which seem almost incredible at times, has been fully substantiated by the admirable studies made by Captain Gephart at St. Paul's School, in Concord, N. H., in which it was found that the boys averaged 5,000 calories per day. The muscular activity during this period was admittedly excessive.

The intense demand of the active, growing child for food is evidenced by the constantly increasing habit of supplementing the food obtained at the table by sweets, ice cream, etc. Captain Gephart found approximately 10 per cent of the total energy obtained by the boys at the St. Paul's School was derived from these sources. So important in the computation of the daily caloric intake have these extra foods become that Mrs. Benedict has been at the Nutrition Laboratory for the past year or two studying directly the caloric content of many of the most commonly consumed extra foods. These have been in part reported, and I need but cite the fact that she has found that with an ordinary ice-cream soda or "sundae" it is not uncommon to secure 500 calories in one portion. It is not surprising, therefore, that growing children clamor for ice-cream cones, doughnuts, and cookies, and are regular patrons of the penny candy counter, the bakeshop, and the soda fountain.

Fortunately the clinician in his estimates of the caloric needs of children has to deal for the most part with the needs of children when moderately quiet and in bed. When a child is very active it does not, as a rule, need a physician.

This is not to be interpreted, however, as disparaging in any sense the careful medical supervision of even so-called "normal" school children. Our analysis of normal versus average and our interpretation of the "ideal weights" for children lead to the firm conviction that children should be supplied liberally with food. It is possible, of course, that when the activity is excessive there should be some restriction, for there are those who believe that excess activity, even with children, ultimately shortens life. It is still, however, the best practice to give a most liberal diet to children, since the greater part of the evidence on underweight indicates that children usually receive too little rather than too much food. I feel that the question as to whether or not the active growing child can have too much food need not trouble anyone.

In view of great variations in muscular activity the only practical method of estimating the fuel requirement of any given child is to encourage storage of fat and satisfy the appetite, provided the child is healthy and active. Groups of children require and use to advantage more food than was generally considered necessary or advisable for ingestion a few years ago. The fuel requirement of a boy may easily be 4,000 calories per day and that may represent too much food for his father even though the latter be so employed as to require moderately active muscular work.

Fuel requirements of persons in different circumstances and under different occupational conditions.—Atwater presented the results of statistical studies of dietaries made by himself, Voit, and others, and proposed dietary standards in Farmers' Bulletin 142 issued by the United States Department of Agriculture, October 29, 1901. Mendel closed his book, *Nutrition: The Chemistry of Life*, in 1923 with the statement:

The science of nutrition is in the midst of a continual evolution of facts and development of truth. For the present, therefore, we should "first get the facts."

Inasmuch as the information regarding the quantities of foods ordinarily consumed by persons in different circumstances as calculated by Voit and Atwater was essentially factual, their figures must be taken into consideration to-day.

Atwater published the following figures relating to quantities of proteins and total fuel value of foods consumed daily by persons in

different circumstances and stated his own and Voit's proposed dietary standards:

Daily food consumption of persons in different circumstances, and proposed dietary standards—Atwater, Farmers' Bulletin 142, United States Department of Agriculture

	Number of studies included in averages	Actually eaten			
		Protein	Fat	Carbohydrate	Total fuel value
		Grams	Grams	Grams	Calories
Persons with active work:					
Rowing clubs in New England.....	7	155	177	440	3,955
Bicyclists in New York.....	3	186	186	651	5,005
Football teams in Connecticut and California.....	2	226	354	634	6,590
Prussian machinist.....	1	139	113	677	4,270
Swedish mechanics.....	5	189	110	714	4,590
Persons with ordinary work:					
Farmers' families in eastern United States.....	10	97	130	467	3,415
Mechanics' families in United States.....	14	103	150	402	3,355
Laborers' families, large cities of United States.....	12	101	116	344	2,810
Laborers' families, United States (more comfortable circumstances).....	2	120	147	534	3,925
Russian peasants.....	—	129	33	589	3,165
Swedish mechanics.....	6	134	79	523	3,330
Professional men:					
Lawyers, teachers, etc., in United States.....	14	104	125	423	3,220
College clubs in United States.....	15	107	148	459	3,580
German physicians.....	2	131	95	327	2,680
Japanese professor.....	1	123	21	416	2,845
Men with little or no exercise:					
Men (American) in respiration calorimeter.....	11	112	80	305	2,380
Men (German) in respiration apparatus.....	5	127	80	302	2,430
Persons in destitute circumstances:					
Poor families in New York City.....	11	93	95	407	2,845
Laborers' families, Pittsburgh, Pa.....	2	80	95	308	2,400
German laborer's family.....	1	52	32	287	1,640
Italian mechanics.....	5	76	38	396	2,225
Miscellaneous:					
Negro families in Alabama and Virginia.....	39	86	145	440	3,395
Italian families in Chicago.....	4	103	111	391	2,965
French Canadians in Chicago.....	5	118	158	345	3,260
Bohemian families in Chicago.....	8	115	101	360	2,800
Russian Jews in Chicago.....	10	137	103	418	3,135
Mexican families in New Mexico.....	4	94	71	613	3,460
Chinese dentist in California.....	1	115	113	289	2,620
Chinese laundryman in California.....	1	135	76	566	3,480
Chinese farm laborers in California.....	1	144	95	640	3,980
Dietary standards:					
Man at hard work (Voit).....	—	145	100	450	3,270
Man at moderate work (Voit).....	—	118	56	500	2,965
Man with very hard muscular work (Atwater).....	—	175	(¹)	(¹)	5,500
Man with hard muscular work (Atwater).....	—	150	(¹)	(¹)	4,150
Man with moderately active muscular work (Atwater).....	—	125	(¹)	(¹)	3,400
Man with light to moderate muscular work (Atwater).....	—	112	(¹)	(¹)	3,050
Man at "sedentary" or woman with moderately active work (Atwater).....	—	100	(¹)	(¹)	2,700
Woman at light to moderate muscular work, or man without muscular exercise (Atwater).....	—	90	(¹)	(¹)	2,450

¹ Fats and carbohydrates in sufficient amounts to furnish, together with the protein, the indicated amount of energy.

The chief value of such dietary standards to-day is that with knowledge of the average consumption, or average needs of persons, and especially of groups of persons doing different amounts and kinds of work, the quantities of foods required may be calculated in time of war or in periods of food shortage arising from other

causes. The standards are likewise useful in planning rations for expeditionary forces, troops in training, etc.

DIETARY NEEDS IN ENGLAND DURING THE WORLD WAR

The experience of the British Army and the studies made in England during the World War regarding the probable food requirements of men in the army and of men and women engaged in war work are of interest. The following information is taken from articles by Sir W. H. Horrocks, published as Chapters I, II, and IV, Vol. II, Medical Services. Hygiene of the War, The Official History of the Great War.

The scale of rations issued in the army at the outbreak of war was estimated to yield approximately:

Protein, 167 grams; fat, 201 grams; carbohydrate, 492 grams; calories, 4,607.

Issues of foods were reduced August 22 and September 21, 1914, so that on the latter date the soldier in England received 3,520 calories. Further reductions in 1915 resulted in the caloric value of food issued being only 2,783, but there was in addition a money grant permitting the purchase of food having a caloric value of about 1,500, so the total caloric value of the food received by the soldier at that time was about 4,300 per day.

In 1917 a distinction was made between soldiers under and over 19 years of age. Those under 19 received, including purchases under the money allowance, approximately 4,040 calories, but those over 19 had a ration the caloric value of which was only 3,893. Due to rising prices in 1917, it was estimated that only about 1,000 calories could be obtained from the money allowances of 5½d. per man per day.

The food committee of the Royal Society estimated that the food-stuffs available during the period 1909-1913 were equivalent to 113 grams of protein, 130 grams of fat, and 571 grams of carbohydrate per person per day, with a total fuel value of 4,009 calories. The committee considered that the minimum dietary requirements of a nation engaged on active work can not be satisfactorily met on a less supply in food as purchased than 100 grams of protein and a total fuel value of 3,400 calories per man per day, a man being an average workman doing an average day's work. These values were not considered sufficient for troops in training.

A study of men undergoing experimental marches carried out under the supervision of the army medical advisory committee indi-

cated that under those circumstances the energy actually expended per man per day was 3,989 and the average caloric value of the food consumed 4,122. Experiences on maneuvers led the staff to recommend the army council to issue food having a caloric value of approximately 4,200. Observations upon convicts at Peterhead had shown the inadequacy of a ration yielding 3,500 calories for moderate work. It was found by Dunlop that when the diet was adjusted to yield 3,700 calories it was just sufficient to prevent loss of weight, except in case of some of the bigger men.

A study undertaken to determine the fuel value of food provided from all sources in 1917 indicated that it was 3,961 calories in the case of men and 4,188 calories in the case of boys. Prof. L. Hill studied a hostel dietary for men and stated the results as follows:

All meals: Protein, 146 grams; fat, 138 grams; carbohydrate, 423 grams. Total fuel value, 3,913.

The food consumed by the soldier over 19 years of age had very nearly the same caloric value as that consumed by the munition worker. Boys under 19 received rather more food, but that was necessitated by the requirements of growth.

Greater shortage of food supplies in the United Kingdom led to further restrictions and discriminations January 28, February 4, and May 1, 1918. After the latter date, owing to the shortage of meat, soldiers over 19 years of age received only 8 ounces of meat, but the money allowance was increased to 6½d. per man per day. The boys' ration was not changed and the 5½d. money allowance was continued in their case. The whole diet for men then had a fuel value of less than 3,500 calories, while that of the food eaten by boys was not more than 3,700. Owing to the national calls for economy in foods the military authorities sanctioned these reductions pending full inquiry as to the work performed by troops in training.

There were practically no data by which the actual work performed by soldiers during training could be estimated. It was considered that the expenditure of energy for the work performed in the circumstances of military life and training can not be economical. The constantly changing movements, the constraint of the various positions, of the load and clothing, and the performance of work at the rate and with the precision required by the instructor, and not in the manner which would naturally be selected by a worker in civil life to meet his own feelings, all militated against economical work.

As the results of studies made by experts in the Western, Eastern, and Aldershot commands, it appeared that the soldier over 19 years

of age would require daily about 4,000 calories of food. But in view of the importance of the problem the military authorities considered that although the figures obtained by studies already made did not show any great excess consumption of food by the recruit, it was desirable to have a more exact estimation made of the work done by the soldier during training. Accordingly a study of the energy expended during all phases of the soldier's daily life, by the method of indirect calorimetry was intrusted to Lieut. Col. E. P. Cathcart and Capt. J. B. Orr. Their studies gave the following data:

Mature recruit

	Weekly energy expenditure		Total calories
	Hours	Calories per hour	
Sleep.....	56	69	3,864
Meals.....	21	108	2,268
Cleaning.....	7	130	910
Fatigues.....	2	207	414
Free time:			
(a) Resting.....	18	75	1,350
(b) Active.....	18	300	5,400
Drill.....	46	235	10,810
			25,016

Daily expenditure, approximately 3,574 calories.

Young recruit

	Weekly energy expenditure		Total calories
	Hours	Calories per hour	
Sleep.....	56	69	3,864
Meals.....	21	108	2,268
Cleaning.....	7	130	910
Fatigues.....	2	207	414
Free time:			
(a) Resting.....	24	75	1,800
(b) Active.....	16	300	4,800
Drill.....	42	228	9,576
			23,632

Daily expenditure, 3,376 calories.

It was considered that an increase of 10 per cent as allowance for waste must be made to obtain the calories of food which should be provided. It would therefore appear from these determinations that the food provided from all sources for men at that time, estimated to have a fuel value of about 3,260 calories, and that for boys, estimated at 3,608 calories, was hardly sufficient to prevent loss of

weight. Inquiries made in commands, however, did not produce any evidence of ill health. Approximately 81 per cent of the recruits gained 1.38 pounds per month; 13 per cent lost 1.07 pounds per month and 6 per cent remained constant in weight.

The average recruit was assumed to be the British Association figure of a man 5 feet, 7.4 inches (171 centimeters) tall, weighing 145 pounds (66 kilograms) stripped, with a surface area of approximately 1.77 square meters. Expenditures of energy may have fallen short of the calculated averages for many reasons. Probably, owing to the fact that many of the recruits enlisted in 1918 were underweight, the average weight was less than 145 pounds. The drill period, which was nominally one hour, doubtless often lasted less than one hour. Possibly the recruit was not so active in the active phase of his rest periods as he was assumed to be.

Cathcart and Orr stated that the soldier in training for the battlefield must be supplied, not only with ample food, but he ought to carry on his person reserves in the form of fat and other materials, in view of the fact that any day he may be compelled by the exigencies of fighting to lose touch with his sources of supply. The man who has no reserve can not carry on and maintain his worth as a fighter.

From the administrative point the diet containing only 8 ounces of meat gave rise to considerable difficulties. The soldier had always been accustomed to a good meat dinner in the middle of the day and it was also desirable to provide a good breakfast. Messing officers found it an increasingly difficult problem to provide these meals in a satisfactory manner. Eight ounces of meat when cooked only represented a little over 5 ounces, which was all consumed at the midday meal. The scale of 2 ounces of bacon daily or 14 ounces a week, provided at most four good breakfasts. Although it was scientifically demonstrated that the calories were sufficient, many soldiers, judging by the eye and by their physical sensations, considered the diet insufficient, and for this reason and for the maintenance of morale the military authorities urged that the issue of meat be increased as soon as possible. It was regarded as unfortunate that this could not be done until 1919 when the strain of war was practically over.

The following table summarizes the energy expended by the average or typical recruit in the various types of training as determined by Cathcart, Orr, and coworkers.

Energy expenditure in calories per square meter per hour, and per average man (1.77 square meters) per hour, for the various items of training

	Calories per square meter	Calories, average man
Lying post-absorptive (basal metabolism).....	37.8	66.9
Lying after meals.....	42.3	74.9
Standing at ease.....	42.9	75.9
Standing at attention.....	50.6	89.6
Sitting (lectures).....	48.6	86.4
Marching, drill order.....	179.9	318.5
Marching, battle order.....	214.2	379.1
Marching, full equipment.....	232.8	412.6
Squad, section or platoon drill, with arms.....	130.6	230.1
Squad, section or platoon drill, without arms.....	88.2	156.1
Company drill.....	128.6	227.6
Entrenching.....	187.2	331.3
Assault.....	216.1	382.5
Bayonet exercise.....	121.4	214.9
Physical exercise.....	141.5	250.5
Bombing.....	95.8	169.6
Rifle bombing.....	111.2	196.8
Musketry.....	100.0	177.8
Anti-gas.....	81.8	144.8
Guard and sentry drill.....	102.3	181.1
Arms drill.....	80.5	142.5
Night operations.....	101.2	179.1
Rapid wiring.....	143.4	253.8
Extended order.....	173.6	307.2
Field work.....	186.5	330.1
Route marching.....	258.4	457.4
Fatigues.....	136.2	241.1
Kit inspections.....	73.6	130.3
Lewis gun.....	53.0	93.8

British field rations on the western front.—The following table indicates the general make-up and estimated total fuel value of rations for British soldiers at the front from time to time during the war:

Scale of rations issuable to British and Dominion troops in France during the war, up to September 30, 1918. Daily scale unless otherwise stated

Article	Field ration (full scale) for fighting troops at front						
	To Oct. 29, 1915	From Oct. 29, 1915	From Apr. 4, 1916	From Jan. 20, 1917	From July 1, 1917	From Jan. 26, 1918	From Sept. 23, 1918
Meat (fresh or frozen).....	1.25 lbs.	1 lb.	1 lb.	1 lb.	1 lb.	1 lb.	15 ozs.
Meat (preserved).....	1 lb.	0.75 lb.	0.75 lb.	0.75 lb.	9 ozs.	9 ozs.	
Bread.....	1.25 lbs.	1.25 lbs.	1.25 lbs.	1 lb.	1 lb.	1 lb.	16.25 ozs.
Biscuit or flour.....	0.75 lb.	0.75 lb.	0.75 lb.	0.75 lb.	10 ozs.	10 ozs.	
Bacon.....	4 ozs.	4 ozs.	4 ozs.	4 ozs.	4 ozs.	4 ozs.	3 ozs.
Cheese.....	3 ozs.	3 ozs.	3 ozs.	2 ozs.	2 ozs.	2 ozs.	2 ozs.
Fresh vegetables.....	8 ozs.	8 ozs.	8 ozs.	8 ozs.	8 ozs.	8 ozs.	8 ozs.
Dried vegetables.....	2 ozs.	2 ozs.	2 ozs.	2 ozs.	2 ozs.	2 ozs.	2 ozs.
Tea.....	$\frac{5}{8}$ oz.	$\frac{5}{8}$ oz.	$\frac{5}{8}$ oz.	$\frac{5}{8}$ oz.	$\frac{5}{8}$ oz.	$\frac{1}{2}$ oz.	$\frac{1}{2}$ oz.
Jam.....	4 ozs.	4 ozs.	3 ozs.	3 ozs.	3 ozs.	3 ozs.	3 ozs.
Butter.....	(1)	(1)	(1)	(1)	2 ozs. ¹	2 ozs.	1 oz.
Sugar.....	3 ozs.	3 ozs.	3 ozs.	3 ozs.	3 ozs.	3 ozs.	2½ ozs.
Oatmeal (three times a week).....	(1)	(1)	(1)	(1)	2 ozs.	2 ozs.	1 oz.
Rice.....	(1)	(1)	(1)	(1)	1 oz.	1 oz.	1 oz.
Salt.....	$\frac{1}{2}$ oz.	$\frac{1}{2}$ oz.	$\frac{1}{2}$ oz.	$\frac{1}{2}$ oz.	$\frac{1}{4}$ oz.	$\frac{1}{4}$ oz.	$\frac{1}{4}$ oz.
Mustard.....	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.
Pepper.....	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.	$\frac{1}{8}$ oz.
Milk (condensed).....	1 tin	1 tin	1 tin	1 oz.	1 oz.	1 oz.	1 oz.
Pickles (weekly).....	1 oz.	1 oz.	1 oz.	1 oz.	1 oz.	1 oz.	$\frac{3}{7}$ oz. ³
Fuel values in calories.....	4,595	4,276	4,232	3,851	4,185	4,185	4,111.

¹ Issued in the form of an "extra" until about July 1, 1917.

² Three times a week.

³ Daily.

Apparently, the need of the average man at the front for more than 4,000 calories per man per day was recognized. In March, 1916, as a result of what appeared at the time to be a probable temporary shortage in the supply of frozen meat, a portion of the issue of frozen meat was replaced by the (to us) familiar pork and beans, a new element in the ration of the British soldier. It was eventually decided to modify the meat ration and introduce pork and beans as a portion. Later pork and beans and vegetables were issued as separate elements and not as substitute for a part of the meat element.

Bacon was reported to be a much appreciated element of the ration. Cheese was also a popular element, but the amount originally issued, 3 ounces, was found to be excessive because some waste occurred. The issue of cheese was reduced to 2 ounces and later to 1 ounce. The latter amount was considered ample in all cases.

The supply of fresh vegetables was one of the greatest rationing difficulties. Notwithstanding repeated and urgent representations on the importance of an adequate supply, fresh vegetables were too often insufficient in amount or not forthcoming, especially in the wintertime. During the winter the issue of an orange per man daily was agreed upon and it was found possible when vegetables were short to make this issue, which proved very popular and was undoubtedly conducive to the health of the troops. It appeared that units receiving an ample supply of vegetables showed a smaller incidence of affections classified as "inflammation of connective tissue" than did those in which the supply of vegetables was inadequate, although controlled investigation was impracticable under war conditions.

The caloric value of the ration for Chinese labor corps was 4,213; for Egyptian labor corps, 4,291; for Fijian laborers, 3,859; for South African labor corps, 4,445; and for British troops engaged in arduous labor such as railway construction, forestry, etc., 4,852 calories.

Food requirements of civilians in England during the World War—men and women in military employment.—In June, 1917, with the recognized need of making every effort to conform to the food controller's recommendations, the army council recommended for men workers, daily:

Protein, 145 grams; fat, 135 grams; carbohydrate, 402 grams;
calories, 3,487.

And for women workers:

Protein, 114 grams; fat, 111 grams; carbohydrate, 339 grams;
calories, 2,878.

The military authorities considered that in the absence of exact estimates of work actually performed by men workers in military

hospitals, it would be wise to adopt as a standard, 3,500 calories in food as purchased. That was considered to be the proper amount for male munition workers in Prof. Leonard Hill's report to the Ministry of Munitions. The requirement for women workers was considered to be 0.8 that of a man, and consequently 2,800 calories in food as purchased was considered reasonable for women workers.

In December, 1917, the Royal Society Food Committee decided that a diet furnishing 3,250 calories would answer the requirements of the moderate male worker. Further restrictions were made in April, 1918.

In December, 1918, following on the improved supply of food in England, the Army Council sanctioned increased allowances for male and female civilian staffs in the military hospitals. Men were then allowed :

Protein, 94.3 grams; fat, 108.9 grams; carbohydrate, 445 grams; calories, 3,225.

And women :

Protein, 78.2 grams; fat, 98.7 grams; carbohydrates, 363.8 grams; calories, 2,731.

It appears that the dietaries then just about met the respective needs.

Food requirements of patients in military hospitals in England during the World War.—The fuel values of hospital dietaries must necessarily depend to a great extent upon the proportionate numbers of bed patients and convalescent patients and also upon the nature of diseases treated and the amount of work required of convalescent patients.

In June, 1917, the British Army Council considered that every effort should be made to conform to the food controller's recommendations in regulating the feeding of patients in hospital. It was recognized that a fixed scale could not be laid down, but a standard scale for 100 hospital patients was proposed. With gradually increasing shortage of food in the country it became necessary to revise this scale from time to time. February 5, 1918, the Army Council instructed that two scales be followed; one, scale A, providing 2,700 calories per patient in a standard group of 100 patients, and the other, scale B, 3,250 calories per patient per day for a group of 100 patients.

Scale A could only be expected to supply sufficient food for hospitals in which at least 60 per cent of the cases under treatment were acute, 60 per cent of the patients thus requiring little more than a subsistence ration, so that the remaining 40 per cent could be provided with rather more than 3,000 calories per patient. It was considered that scale B would give similar caloric values if the pro-

portion of convalescent patients should rise to 60 per cent. The medical authorities considered the scales to be somewhat too low, but felt they were justified in accepting them in view of the existing shortage of food in England.

These scales were insufficient for men doing physical work, as in orthopedic hospitals and hospitals for the treatment of venereal diseases, where the patients did physical work, and likewise for patients in hospitals where convalescent patients were employed in route marching or other physical exercises. They were only intended for patients in bed or doing no work.

An improved condition of the food supply in the country enabled the Army council in October, 1918 to authorize an increase of scale A to 3,145 calories and scale B to 3,443 calories. The rations were then more satisfactory. They enabled convalescent patients to receive food having a caloric value well above 3,500.

In 1919, owing to great increases in the numbers of convalescent patients in the hospitals, requests were received from commands, and especially from Dominion contingents, for more food. For practically all military hospitals in the United Kingdom, it was found that the proportion of convalescent patients had risen 80 to 90 per cent. A ration scale such as scale A, providing only 3,145 calories per patient, was obviously useless. A new scale was then introduced to provide approximately 3,832 calories per patient per day.

Considerable space has been devoted to a review of food conditions and requirements in England during the World War as discussed in the official history, *Medical Services, Hygiene of the War*, published by His Majesty's stationery office in 1923, because it may be taken for granted that the various estimates of caloric values required were not unduly liberal in view of pressing need for economy and prevention of waste. The quantities of foods considered necessary under different conditions of work and military training are of interest in connection with the findings of Voit, Atwater, Chittenden, and others. The estimated expenditures of energy in doing the various kinds of military work required in training recruits are of special interest to medical officers of the Army and Navy.

THE UNITED STATES ARMY RATION

The following information is taken from Volume VI, *The Medical Department of the United States Army in the World War*, published by the War Department, 1926. Lieut. Col. J. R. Murlin (S. C.), states in Chapter VII, *The Army Ration*, that the 1908 rations were in force when the United States entered the World War. The first new ration, resulting from the previously untried conditions in the World War, was the landing or debarkation ration provided to meet the needs of troops going to France via England. It appears that

this ration was used only on board a few transports, because most of the troops not carried in United States Navy transports were carried in chartered British transports and were fed upon an English scale of rationing. Those transported by the United States Navy were fed the Navy ration.

Nutritional surveys were carried on in the United States, and early in 1918, when 227 Army messes had been reported upon, the average amount of each food article supplied, whether by the quartermaster or by outside purchase, was carefully reckoned. The ration list constructed by assembling these average amounts represented a wide departure in certain respects from the prescribed ration. Based upon a conviction that the unrestricted taste of the soldier was a fairly safe index of desirable alterations, particularly as they coincided with alterations indicated by the experience of many officers who reported upon the 1908 ration and agreed also with alterations dictated by the newer discoveries in the science of nutrition, a revision was proposed by the Surgeon General to The Adjutant General, June 3, 1918.

The term "training ration" was proposed. The French had their "normal ration" for training and their "strong ration" for the field. The English had their "home ration" for training in home camps and their "field" or "field and trench ration" for actual military operations. The Italians had their "territorial ration" for home camps and "combative ration" for active campaigns. The term "garrison ration" of the United States Army was seemingly a misnomer for large concentration camps, for it was recognized generally that a division of troops in a training camp could be subsisted on a smaller ration than a small garrison in an isolated post. The proposed revisions were summarized as (1) reduction of meats, flour, pickles, pepper, salt, and sirup; (2) increase of beans, rice, dried or fresh fruits, jam, sugar, milk, and butter; (3) addition of oatmeal as a component of the ration.

The total fuel value of the proposed "training ration" was 4,243 calories. The calculated value of the existing "garrison ration" under similar conditions was 4,757 calories. The findings of nutritional surveys made of 427 messes indicated that the smaller ration provided more than enough food after allowing 7 per cent for waste and providing a safe margin for savings. The reasons advanced from the nutritional point of view for the adoption of the proposed ration were: (1) It conformed to actual usage; (2) the protein provided was more than sufficient, as shown by actual consumption of meats, and was of better quality; (3) reductions in articles issued were counterbalanced in nutritive value by increases; (4) the proposed ration was better balanced with respect to protein, fat, carbohydrate, and mineral salts; (5) more roughage was provided. The

following reasons were also urged from the standpoint of conservation and food economy; (1) meat and bread are the principal items of waste and they should therefore be reduced; (2) the existing ration was regarded as excessive; (3) the new ration would cost 3 cents less than the garrison ration.

After a series of conferences between representatives of The Adjutant General, the Inspector General, the Quartermaster General, and the Surgeon General, the subsistence division, Quartermaster Department, prepared recommendations for presentation to the General Staff. The final system proposed contemplated the purchase of all materials through the quartermaster and the elimination of mess savings. This proposal did not meet with the approval of the Surgeon General, who held that for hospitals, especially, it was essential that the mess funds be expended by the mess officer under the direction of the commanding officer, and that the savings principle at least should be retained for all messes as a stimulus to economy, even though the amount of savings should be reduced.

As a result of the several recommendations, changes to Army Regulations were made and they became effective April 1, 1919. The ration was not changed but a sliding scale for organizations of different size was adopted; the savings principle was eliminated, and purchases were directed to be made by the camp quartermaster only. From reports received officially and unofficially the Surgeon General formed the opinion that the net results were unsatisfactory. In hospitals nearly universal dissatisfaction with the new regulation was expressed. Because of difficulties in mess management to which the changes in Army regulations gave rise, a further change was made to become effective December 1, 1919. The sliding scale for organizations of different sizes was made to include one averaging 25 men, thus removing one objectionable feature formerly obtaining, particularly as regards small organizations; for example, many small hospital detachments. Also, ration savings were again authorized (not to exceed 25 per cent of the total value of the ration allowance), such savings to be applied solely to the purchase of food or refreshment of the organization concerned.

The writer is informed by Col. J. F. Siler, Medical Corps, United States Army, office of the Surgeon General of the Army, that mess conditions are now (January, 1927) very unsatisfactory. The fuel value of the food as issued in different organizations has not been estimated but there appears to be widespread dissatisfaction among troops. The ration list, known as the garrison ration, which serves as the basis of food allowances, or, as it works out in practice, the basis for calculating the amount of money as mess savings that can be spent for the purchase of desirable foods to supplement the limited variety of foods covered in the basic list, is the same as the

garrison ration of 1913, estimated by Murlin to have a fuel value of 4,757 calories. This does not mean that the soldier's diet is of such high fuel value.

A ration is defined in Army Regulations as the allowance of food for the subsistence of one person for one day. The garrison ration as listed is a convenient grouping for administrative purposes of certain principal components—meat, flour, vegetables, fruit, coffee, sugar, evaporated milk, butter, vinegar, pickles, salt, pepper, lard, sirup, lemon extract, and cinnamon. Protective foods are obviously lacking or are included in such small amounts that well-balanced diets can not be provided without purchasing additional articles of food for substitution in part for articles under one or several components having high fuel value or allowed in unnecessary amount so far as the use of the particular item is concerned. The purchase of all necessary or desired articles of food is theoretically made possible by providing that money saved through underissue of ration components as listed, up to 25 per cent of the total value of the ration allowance may be applied to the purchase of desired food. The practical difficulty appears to be, notwithstanding the fact that an allowance of food is authorized—the garrison ration, with certain percentage additions and deductions depending upon the size of the organization—stern reality requires that soldiers be fed according to the amount of money appropriated or that the number fed be reduced. It appears that the cost of the ration was 36.12 cents per man per day during the last fiscal year. The difficulty of feeding a properly balanced, varied, and palatable diet of adequate fuel value with present market prices of foods for 36 cents per person per day is apparent.

To determine just what fuel values soldiers in different commands are receiving it would be necessary to analyze the actual issues of all nutrients over sufficiently long periods to obtain fair averages. It is not possible to make a very close guess. Market conditions vary and doubtless the money available is not everywhere invested in food to equal advantage. Maj. R. D. Harden, in Colonel Siler's office, states that the present ration (food that can be provided) does not permit a well-balanced diet in the Army comparable to that of civilians in similar walks of life, even with great economy and ingenuity and skill on the part of the cook. The mental attitude of the soldier is a gauge of the efficiency of the organization to which he belongs. A man belonging to an organization which has a poor mess is more apt to become delinquent. Infractions of discipline are more frequent under those conditions. In many cases, according to Major Harden, soldiers do not receive the variety of food necessary to supply their natural demands. Post exchanges and other accessible restaurants are doing a thriving business in furnishing food to soldiers.

Such definite deficiency diseases as scurvy and beriberi are not seen in the Army, but many men complain of minor ailments which can not be definitely classified under diagnostic titles, and the same men frequently reappear for medical advice, such men often being known as "gold bricks." Many cases of vague digestive disturbances are encountered. Constipation is common. Dental surgeons are busy caring for conditions which it now appears may be influenced by diet.

Maj. F. E. Gessner, Medical Corps, United States Army, has recently prepared a thesis on the Army ration, which will appear in a forthcoming number of *The Military Surgeon*. Among his conclusions are the following:

The present method of supplying rations for the soldiers—the ration-savings system—appears to be satisfactory, but the ration allowance is not sufficient to permit the purchase of an adequate supply of foods rich in the essential protective substances without the utilization of other funds.

The present ration components and sales articles do not furnish a balanced diet, do not contain sufficient protective vitamins, and purchases in the open market are necessary to provide foods rich in these essential substances. At seasons when such foods are expensive it is impossible for many messes to purchase them in sufficient quantities.

The components of the present ration and sales articles offer a limited variety, which should be avoided. As an instance, beef may be purchased from the quartermaster at a much lower price than other meats in the open market, and since the ration allowance is based on the price of beef, it is almost impossible to substitute other meats in reasonable amounts.

Fresh vegetables of the green leafy type are not provided as components of the ration, and adequate savings can not be made from the present vegetable component to permit the purchase of those foods which are rich in protective vitamins at all seasons.

Fresh fruits are not provided as components or substitutive articles, and there is no allowance for purchase of these valuable foods. If they are in the mess they must be purchased at the expense of some one of the components or from company funds obtained from other sources.

The allowance of butter is so small as to be almost negligible, and the authorized substitute is a substitute in name only.

The milk ration is so small that it barely meets the requirements for use in coffee.

The allowance of coffee is not sufficient to meet the popular demand.

Eggs are not included as a component of the ration, although they are undoubtedly used to a considerable extent in all messes. They are either purchased from savings on other articles or from other funds.

The savings from ration allowances and the use of company funds provide for some of the deficiencies of the ration, and the post exchange, where many articles rich in vitamins are sold, furnishes food to the soldier at his expense, although the Government is supposed to furnish him a satisfactory allowance for food.

The Army ration, unlike the Navy ration, is not fixed by statute. Section 40 of the act entitled "An act to increase the efficiency of the permanent Military Establishment of the United States,"

approved February 2, 1901, authorizes the President of the United States to prescribe the kinds and quantities of the component articles of the Army ration and to direct the issue of substitutive equivalent articles in place of any such components whenever in his opinion economy and a due regard to the health and comfort of the troops may so require.

In 1925 the Executive order of May 13, 1914, prescribing the Army ration, was revoked, and a new Executive order was promulgated, to take effect October 1, 1925. The order provided that the kinds and quantities of the component articles of the Army ration shall be as follows:

Garrison ration (for all persons entitled to a ration except under specific conditions for which other rations are prescribed)

Meat:	Quantity
Beef, fresh or frozen.....ounces	14
Bacon.....do	3.6
Flour, wheat.....do	18
Baking powder.....do	.08
Dry vegetables:	
Beans.....do	1.2
Rice.....do	.8
Fresh vegetables:	
Potatoes.....do	14
Onions.....do	4
Tomatoes, canned.....do	2
Fruit:	
Prunes.....do	.384
Jam.....do	.64
Apples, evaporated.....do	.128
Peaches, evaporated.....do	.128
Coffee, roasted or roasted and ground.....do	1.12
Sugar.....do	3.2
Milk, evaporated, unsweetened.....do	.5
Butter:	
Butter.....do	.25
Oleomargarine.....do	.25
Vinegar.....gill	.08
Pickles, cucumber.....do	.08
Salt.....ounce	.64
Pepper, black.....do	.04
Lard:	
Lard.....do	.32
Lard substitute.....do	.32
Sirup.....gill	.32
Lemon extract.....ounce	.014
Cinnamon.....do	.014

This ration does not differ from the 1913 garrison ration, having a theoretical fuel value of 4,757 calories.

The order further provides that in Alaska the beef component will be increased by 10 per cent, the bacon component by 33 $\frac{1}{3}$ per cent, and the vegetable component by 20 per cent.

On Thanksgiving Day and on Christmas Day the meat component will be drawn turkey, 16 ounces, or undrawn turkey, 19 ounces.

When it is impracticable to bake soft bread, or if for any reason it is more economical to purchase than to bake it, soft bread will be a component in lieu of an equal quantity of flour.

An important feature of the order was that it provided for the following additions and deductions to be made on the rations due:

(a) For organizations averaging 25 men per day or less, add 10 per cent.

(b) For organizations averaging 26 to 75 men per day, add 5 per cent.

(c) For organizations averaging 76 to 150 men per day, make no change.

(d) For organizations averaging more than 150 men per day, deduct 5 per cent.

(e) For individual men authorized by the commanding officer of the post, camp, or station to mess separately, add 10 per cent.

(f) For enlisted men serving and messing on Army mine planters, add 50 per cent.

(g) The amount of ration credit due an organization maintaining separate messes for detachments will be computed by applying the foregoing provisions for organizations to each mess so maintained.

Army regulations provide for the following kinds of rations:

- (1) The garrison ration.
- (2) The Filipino ration.
- (3) The travel ration.
- (4) The field ration.
- (5) The reserve ration.

Filipino ration.—The Filipino ration is that for Philippine Scouts in time of peace. Its value is very much less than that of the garrison ration. Sixty per cent of the beef component is allowed, 50 per cent of the bacon, 40 per cent of the flour, 40 per cent of the potato component, etc.

Travel ration.—The travel ration is for troops traveling otherwise than by marching and separated from cooking facilities. The food allowance is as follows:

	Quantity
Bread, soft.....	ounces 18
Bread, hard.....	do 16
Beef (corned) or hash (corned beef).....	do 12
Beans, baked.....	do 4
Tomatoes, canned.....	do 8
Jam.....	do 1.4
Coffee, roasted and ground.....	do 1.12
Sugar.....	do 2.4
Milk, evaporated, unsweetened.....	do .5

Field ration.—The field ration is that prescribed for all persons entitled to a ration in time of war and whenever the ration-savings privilege is suspended. The component allowances are prescribed by the War Department or by the commander of the field forces and will correspond as nearly as practicable with the components of the garrison ration.

Reserve ration.—This is for use in campaign when the field ration is not available. The components are as follows:

	Quantity
Beef, corned.....	ounces-- 7.0
Beans, with pork and plain sauce.....	do---- 7.0
Bread, hard.....	do---- 6.6
Chocolate, vanilla, sweetened.....	do---- 3.0
Coffee, soluble.....	do---- .6
Sugar, granulated.....	do---- 2.4

The reserve ration is held as part of field equipment. Organization commanders are responsible for proper care and use of reserve rations. Except in emergencies, reserve rations are only to be opened by order of a commissioned officer.

Elasticity of the Army ration.—The garrison ration, in view of regulations relating to the ration and savings accounts, is elastic enough for all purposes, provided the money saved through under-issues of various components is sufficient, with current market prices, to purchase great enough quantities of such protective foods as milk and milk products, fresh leafy vegetables, fresh fruits, and canned equivalents. There is no restriction as to the kinds of desirable foods that may be purchased for an Army mess provided mess funds are available.

General considerations.—The difficulty the Army is now experiencing in feeding its men is about what the Navy might expect if its annual appropriations for administering the ration should be reduced. It would be necessary either to reduce the strength of enlisted personnel or to provide food according to the ration law at lower cost. In the latter event, while it still might be possible to provide the ration components or their equivalents in the amounts specified and thus provide sufficient calories, the variety of foods issued would necessarily be restricted. It would be necessary to issue smaller amounts of the more expensive component equivalents. In general, articles which are good sources of vitamins and minerals are expensive. In general, too, protein of good biological value is expensive.

Although the Navy ration is more general in its terms regarding components, and fresh food equivalents are provided for in the ration law, in practice the governing factors are the same for the Navy as for the Army. If it be assumed that the men are to have properly

balanced diets and not merely a sufficient number of calories, the governing factors are, briefly, market prices, the amount of money appropriated, and the number of men to be fed. Within the limitations imposed by market prices, there may, of course, be remarkable differences in the variety and quality of the food served in different messes, with respect to fuel value, quality of protein, vitamins and mineral content, depending upon sources of supply, the degree of skill displayed in managing mess affairs, and the competency of cooks.

Well-balanced diets of adequate fuel value, providing food that is satisfactory to the men in quantity and quality, must necessarily in most instances cost more for a force afloat than for an organization ashore which is constantly in touch with meat, fish, vegetable and fruit markets, and dairies. Transportation as well as storage of perishable foods involves additional expense. That is largely the reason why the diet of the average enlisted man on board ship to-day is open to reasonable criticism in spite of the fact that the Navy ration costs about 50 cents per man per day as compared with 36 cents for the Army ration. No doubt, 36 cents is too little to spend for the food of an active man if his needs for calories and also his physiological needs for vitamins and essential minerals are to be met with current market prices. It has been demonstrated by analytical study of ration returns of foods actually issued to the crews of three battleships over a period of about two months, that the diet of the average man was deficient in protective foods in spite of the fact that the Navy ration was costing a little more than 50 cents per man per day. A number of factors are involved, however, besides the item of cost. Perhaps organizations ashore can be properly and adequately fed with present market prices for a little less than 50 cents per man per day. While it is doubtless true that the crews of certain naval vessels, under favorable conditions, can be provided with well-balanced diets of sufficient fuel value at an average cost of less than 50 cents per man per day, the available evidence indicates that the men attached to cruising ships can not generally be properly fed with present market prices while the average cost of the ration for the entire Navy is as low as 50 cents per man per day.

The system of authorizing an allowance of food for the soldier or sailor by Executive order or by law is rather complicated. The cardinal principles involved in the proper feeding of groups of persons are quite simple.

The first question is, Are the cooks good cooks and are they competent to handle the food to good advantage and prevent unnecessary waste? The next question is, Does the commissary officer or person in charge understand what a well-balanced diet is, and is he skilled in spending money economically for the purchase of such foods as

are necessary and obtainable in the markets at reasonable prices to provide meals of sufficient fuel value, depending upon the physiological characteristics and muscular activities of those eating the food; meals that not only promote contentment but furnish all essential dietary factors? The third question is, Will the money available be sufficient to purchase the foods required for a properly balanced and satisfying diet of sufficient fuel value, considering age and muscular activity?

Under a ration system the commissary officer must proceed indirectly to construct satisfactory menus. A ration allowance is usually a more or less restricted list of foods which alone will not make it possible to construct satisfactory menus unless equivalents of good protective value are provided for in the ration order or unless any desired article of food can be substituted in part for any component of the ration. Practically, a monetary limit must be placed on the use of equivalent or substitutive articles. Much time must be spent on arithmetical calculations to determine how much money can be spent for substitutive articles.

A given ration to prove satisfactory must either provide actual and adequate allowances of milk and milk products, as well as a good variety of fresh and canned vegetables and fruits in generous amounts, or, if such protective foods are not thus directly provided for, the fuel value of the ration as constructed must be as much greater than the actual caloric requirements of the average soldier or sailor as may be necessary with current market prices to make possible the purchase of all necessary or desirable articles. The protective foods for the most part are comparatively expensive and comparatively low in fuel value. Their substitution to a desired extent for fixed components of the ration greatly reduces the caloric value of the food actually served to the men while increasing the cost of feeding them up to the limit imposed by the money value of the ration components in the amounts allowed. A further complication may be that the total appropriation may be insufficient to feed the total number of men in active service according to the provisions of the existing ration order or law.

To improve a defective ration system it is necessary either to increase the excess caloric value of the ration by increasing the allowed quantities of one or all specified components so that the savings from underissues will suffice for the purchase of whatever additional foods are required, or it is necessary to write vitamins and minerals into the ration list by adding a good variety of protective foods as components of the ration in desirable amounts. If the ration list is to be a short one, either the components must be listed in general terms as fresh or frozen meat, fresh or preserved vege-

tables, fresh or preserved fruits, etc., or the ration-savings feature must be accepted and authorized for no small percentage of possible mess savings. An alternative plan is strict adherence to a prescribed ration with an out-and-out allowance of money in addition to the authorized allowance of food.

This is a sensible plan. It appears to have prevailed in the British Army in England until the necessity for governmental control of food supplies made certain other arrangements imperative.

When all is said and done, the fact remains, if the morale of a military organization is to be what it should, the men must be contented. To remain contented, they must be satisfied with the quantity, quality, and variety of the foods served to them. In addition, inasmuch as they may be fully satisfied by a diet that is deficient in protective foods the medical department must use every effort to see to it that hygienic requirements are fully met. It is unfortunate but not surprising that more money is required for the same fuel value if the diet is to satisfy all hygienic requirements and promote contentment.

SUBSISTENCE IN THE UNITED STATES MARINE CORPS—METHOD OF HANDLING THE NAVY RATION

The law (act of July 11, 1919, 41 Stat. 154) which now applies, provides that except when detached by the President of the United States for duty with the Army, enlisted men of the Marine Corps shall be entitled to the same allowance for rations as are enlisted men of the Navy, under such rules and regulations as may be prescribed by the Secretary of the Navy.

In conformity with the law, regulations now provide that all posts and stations of the Marine Corps will be subsisted on the computed Navy ration allowance, unless otherwise authorized by the major general commandant. The term "ration" is defined as the allowance of subsistence for one man for one day. In the case of very small posts or detachments, the major general commandant may direct that the men of such units or organizations be subsisted on the fixed Navy ration *allowance*, which is a daily money allowance prescribed from time to time by the Secretary of the Navy. Such an allowance is a credit allowance only, there being no actual cash involved, and provisions are issued to the mess against that credit. In all cases messes obtain provisions in the same manner and render a monthly return of subsistence stores.

The method of handling the ration at naval stations and on board ship is separately to compute over and under issues of the several components of the ration as prescribed by law, in order to determine the amounts of equivalents or substitutive articles that may

be issued daily, weekly, monthly, and so forth. This method is considered to be too complicated, under many conditions at least, for subsisting Marine Corps personnel, especially small detachments and mobile forces. A comparatively simple method has been adopted. Under the authority conferred by law upon the Secretary of the Navy to prescribe rules and regulations, each detachment or organization having a mess in authorized and required to calculate as of the first day of each month the money value of the ration per man per day, which will hold during the month. For this purpose the following arrangement is made of components of the Navy ration.

Computation table for determining unit ration value

Per cent	Component	Quantity allowed	Unit price	Value
100	Flour, issue.....pounds..	112.5		
30	Bacon, issue.....do..	37.5		
70	Beef, issue, fresh.....do..	122.5		
10	Beans, navy, dry.....gallons..	.9375		
60	Potatoes, fresh.....pounds..	105.0		
20	Onions, fresh.....do..	35.0		
10	Tomatoes, canned.....do..	7.5		
30	Peaches, canned.....do..	2.25		
30	Apples, evaporated.....do..	1.125		
40	Jam, blackberry.....do..	3.00		
15	Cocoa, issue.....do..	1.875		
75	Coffee, R. and G.....do..	9.375		
10	Tea, issue.....do..	.3125		
100	Milk, evaporated.....do..	6.25		
100	Butter, issue.....do..	12.5		
100	Cheese, issue.....do..	3.57		
100	Lard, issue.....do..	7.375		
100	Macaroni, issue.....do..	3.57		
100	Mustard, dry.....do..	.446		
100	Pepper, black.....do..	.446		
100	Pickles, cucumber.....do..	3.57		
100	Salt, issue.....do..	3.57		
100	Sirup, issue.....gallons..	.446		
100	Cinnamon.....pounds..	.1116		
100	Sugar, granulated.....do..	25.0		
100	Vinegar.....gallons..	.8928		
100	Baking powder.....pounds..	.5		
100	Extract, lemon.....do..	.0875		

Value of 100 rations.....

Value of 1 ration.....

In general, the prices of the most recently received lots of the various food articles listed in the table are taken on the first day of the month to determine the unit prices to be entered on the form. When these have been entered it is a simple matter to add up the values for the quantities allowed for 100 men for one day and divide by 100, thus obtaining the money value of the ration per man per day, an average daily cost which must not be exceeded for the month as a whole. Monthly instead of quarterly subsistence accounting is required. There is no mess savings feature as in the Army and no difference in the food allowances for organizations of different size, but, as noted above, by direction of the major general commandant, a small detachment may be subsisted on the money allowance of the

Navy ration fixed by the Secretary of the Navy (Bureau of Supplies and Accounts) for certain small vessels, etc. That allowance at present is \$0.60, \$0.70, \$0.80, \$0.85, \$0.95, and \$1.20, depending upon conditions under which small groups of naval personnel must be subsisted. Small marine detachments which are placed on a fixed money allowance are granted 60 cents per man per day. Such detachments on a fixed Navy ration allowance are not required to compute the cost of the ration.

The instructions for organizations which do compute the value of the ration for the month are that the unit prices used shall be the current contract price, last contract price if there is no current contract, or the invoice price of the last lot received prior to the first day of the month, as the case may be. At newly established posts or organizations, where no contracts have been made, the invoice price of the first lot of a component received by invoice or purchase is used in computing the value of the ration for the first month or part thereof. Prices once determined and entered on the return govern all expenditures during the month except in the case of stores received during the month, the prices of which are at great variance with established prices, and then only after all stock on hand at the old price has been expended. In computing the cost of the ration on the first day of the month for articles where it is necessary to use the price of the last lot received, should any of the last lots contain two or more lots of the same articles received on the same invoice or on the same date, at different prices, the unit price is determined by dividing the total value of such lots by the total quantity.

The same procedure applies to issue articles other than components of the ration. When component articles are purchased under contract or furnished on invoice in different kinds of packages, at different prices depending upon kind of package, the current or invoice price of the article in the least expensive package is used. Explicit instructions cover the method of fixing the price of fresh beef, a component article, when obtained from live cattle purchased and kept on hand to supply meat for troops.

Organizations on the Pacific coast are furnished dry provisions, including all preserved and so-called nonperishable foods, purchased under contracts made by the Marine depot quartermaster at San Francisco, Calif. Organizations on the Atlantic coast and in the West Indies receive such provisions from the Marine depot at Hampton Roads, Va., contracted by the quartermaster, Marine Headquarters, Washington, D. C.

Beef and fresh meats, poultry, lard, fish, fruits, and fresh vegetables are purchased under monthly contracts awarded at San Fran-

cisco for delivery on the west coast and by contracts with Marine headquarters for delivery on the Atlantic coast. Fruits and vegetables of such nature that they are purchased in small quantities are obtained by local quartermasters at open purchase. With all articles so purchased there must, of course, be competition among local dealers.

The ration is completely elastic. There are no restrictions whatever as to the kinds of foods that may be served in the mess so long as the articles issued are actually foods and the money value of the ration allowance is not exceeded. Mess savings are not authorized and any credit remaining at the end of the month is not available for the following month.

ALLOWANCES FOR MEN ON DUTY WHERE QUARTERS OR RATIONS IN KIND ARE
NOT FURNISHED

Under the provisions of the act approved June 10, 1922 (Executive order No. 3694, June 19, 1922), enlisted men on duty where quarters or rations in kind are not furnished are granted allowances as follows:

	No Government messing facilities furnished	Government messing facilities furnished
1. General:		
(a) Subsistence.....	\$1. 20	\$1. 00
(b) Quarters.....	. 75	. 75
2. Special—Alaska, Europe, and South America:		
(a) Subsistence.....	2. 10	1. 90
(b) Quarters.....	1. 00	1. 00

ALLOWANCES WHILE TRAVELING

	Travel status	Travel status involving detention	
		Detention of less than 7 days	Detention of 7 days or over, but not more than 31 days
1. Sleeping-car, stateroom accommodations, or other quarters furnished:			
(a) Subsistence.....	\$2. 25	\$1. 65	\$1. 40
2. No sleeping-car, stateroom accommodations, or other quarters furnished:			
(a) Subsistence.....	2. 25	1. 65	1. 40
(b) Quarters.....	1. 50	1. 00	. 75
3. Special—Alaska, Europe, and South America:			
(a) Subsistence.....	2. 50	2. 50	2. 10
(b) Quarters (if not furnished by the Government).....	1. 50	1. 00	1. 00

CASH FOR HOT COFFEE

When cooked rations are furnished to enlisted men traveling, a sufficient amount of cash may be provided for the purchase of hot

coffee en route to the extent of 1 pint per man per meal. Cash is also provided for necessary lodging while awaiting transportation when it is impracticable for men to be quartered at a marine barracks, post, camp, or recruiting station.

COMMUTATION OF RATIONS

Commutation at the rate prescribed by law may be paid to non-commissioned officers rating with chief petty officers of the Navy, in the cases of married men who will subsist themselves with their families, provided the messes to which such men belong will not be left with too few members to permit economical administration, if they are recommended by the commanding officer for such privilege and the recommendation is approved by the major general commandant.

SUBSISTENCE IN FIELD HOSPITALS

Officers of the Marine Corps and Navy who are patients in a field hospital are charged the commuted value of the hospital ration.

Enlisted men, both of the Navy and Marine Corps, who are patients, are allowed commutation at the rate of 75 cents per man per day, paid by the disbursing officer of the organization or the officer having the pay accounts of such men. The amounts so paid in the case of enlisted men of the Navy are charged to the appropriation "Provisions, Navy," and in the case of enlisted men of the Marine Corps to the appropriation "General expenses, Marine Corps."

Enlisted men of the Navy attached to a field hospital are rationed in the regular mess, which is reimbursed by transfer of funds from the Navy to the value of the ration commuted or fixed, as the case may be.

AVERAGE COST OF THE MARINE CORPS (NAVY) RATION

During the fiscal year 1926 the average cost of the ration, all Marine Corps messes, including small messes on fixed allowance of 60 cents per man per day, was \$0.5472. All forms of waste and deterioration rendering food unfit for consumption are included in this figure as well as money expended to purchase ice for preservation of food. The figure represents the aggregate cost of operating messes. It does not include money allowed men on detached duty for subsistence at the rate of \$1.20 per man per day, or quarters and subsistence for recruiting parties, money allowance for men in travel status, etc.

The average daily cost of the ration for a large organization in the eastern part of the United States during the same fiscal year was \$0.5105 per man, exclusive of the cost of ice for preservation of the ration and deterioration of foods prior to issue to messes. With these items included the cost was \$0.5190 per man per day. Similarly, the average daily costs for a large organization on the Pacific coast were, respectively, \$0.5520 and \$0.5593 per man per day.

THEORETICAL FUEL VALUE OF THE NAVY RATION AS ALLOWED THE UNITED STATES MARINE CORPS

The aggregate fuel value of the components of the ration as listed on a previous page in the quantities allowed for computing the average daily money value of the ration amounts to 6,138 calories per man per day. Of course, the fuel value of the food actually issued in messes is much less. A study of mess dietaries would probably show that the fuel value of foods issued or consumed would average less than 4,000 calories per man per day. As repeatedly mentioned in discussing various rations, the calculated fuel value of an allowed list of ration components has no very direct bearing on the fuel value of food consumed, or, more specifically, on the fuel value of food issued, consumed, and wasted in general messes.

QUESTIONS AND ANSWERS ON SMALLPOX AND VACCINATION¹

By J. P. LEAKE, Surgeon, United States Public Health Service

The following questions are not infrequently asked by physicians in regard to variola and its prevention. Part of the answers given are supported by good evidence, part by conclusive evidence, but much, unfortunately, is only opinion—a personal weighing of such evidence as is at hand; yet each of the questions should have a tentative answer, according to the best light available. Further information may change the answers given here. Though for nearly every statement that can be made concerning smallpox, some support can be found in the literature, a few of the observations here recorded are original. It is hoped that many of the gaps in our knowledge of smallpox and vaccination may soon be filled; of all infectious diseases prevalent in the United States this disease is the most completely preventable by public health measures.

1. *What is the best method of vaccination?*

Probably the "multiple pressure or prick" method.² This consists of a shallow, tangential pricking of the cleansed, but not irri-

¹ Received for publication Dec. 19, 1926.

² Various names have been applied to different forms of this method, including "acupuncture," "multiple puncture," and the names of different individuals who have made slight modifications and have been responsible for its use. Perhaps the Suttons, of London, in

tated, skin with a needle, through a drop of smallpox vaccine, covering an area not greater than one-eighth of an inch (3 millimeters) in diameter. This gives little chance of accidental infection and the eruption is typical.

Acetone has been found satisfactory for cleansing the skin. It is somewhat more efficacious and rapidly drying than alcohol. The needle, which should be new, sharp, and sterile, is not thrust into the skin, but is held quite parallel or tangential to it, with the forefinger and middle finger of the right hand above the needle and the thumb below the needle pointing to the operator's left. The needle should be crosswise of the arm, so that the thumb of the operator is not impeded by hitting the skin. The side of the needle point is then pressed firmly and rapidly into the drop about thirty times within five seconds, the needle being lifted clear of the skin each time. This rapid to-and-fro motion of lifting the needle and pressing it against the skin should be quite perpendicular to the skin and needle and not in the direction of the needle. In this way the elasticity of the skin will pull a fraction of an inch of the epidermis over the point of the needle at each pressure, so that the vaccine is carried into the deeper epithelium (cuboidal prickle-cell layer), where multiplication takes place most easily. If the skin has not been unduly rubbed in cleansing and if the motion is entirely perpendicular to the needle, no signs of bleeding will occur and all evidence of the punctures will fade out in less than six hours. Immediately after the punctures have been made the remaining vaccine is wiped off the skin with sterile gauze and the sleeve pulled down, the whole operation of puncturing and wiping taking less than 10 seconds. With strong vaccine a single pressure not infrequently gives a "take." Only six pricks or punctures were formerly advocated; comparative tests showed this to be inferior to the scratch method in percentage of "takes." By the use of 30 pricks this difficulty has been overcome and the percentage of "takes" is as high as with any other safe method. For primary vaccinations, where the

the prevaccinal inoculation days (1763) were the first to attempt to deposit virus between the skin layers, and Jenner himself used a form of this method in some of his early vaccinations. Doctor Kinyoun, formerly of the United States Public Health Service, was chiefly responsible for the introduction of the method in a modern form, making oblique punctures with a needle instead of a lancet; and Dr. H. W. Hill, then of London, Ontario, described and popularized it by publication. As modified by myself and described above, this method differs in only two or three details from the method used by Kinyoun and Hill, principally in that the needle is held entirely parallel or tangential to the skin and is pressed sidewise. A description was sent to Dr. Benjamin White, who published it in the Boston Medical and Surgical Journal of July 30, 1925. The second printed description of this method was that courteously distributed to physicians of Providence, R. I., later in 1925 by the dean of American health officers, Dr. Charles V. Chapin. None of the names suggested are sufficiently descriptive; "acupuncture" and "multiple puncture" both imply a driving motion of the needle through the skin layers instead of the simple pressure of the side of the point; even "prick" and "tattoo" are suggestive of a more direct puncture. "Multiple pressure" may best convey the idea.

mildest possible "take" is desired, and where other attempts with highly potent vaccine will be made promptly if the first is unsuccessful, the number of "pricks" may be reduced to 10 or even to a single prick.

The disadvantages of this method, which it shares with some other methods are, first, that without demonstration and practice the technique of applying the proper pressure may not easily be acquired, and second, that without due care an area larger than one-eighth of an inch (3 millimeters) in diameter may be covered by the insertion. In regard to the first point, the difficulty is usually that the needle is not pressed in the right direction or that the pressure is not firm enough. Provided the needle is held quite tangential to the curve of the arm, and the direction of motion is quite perpendicular to the needle, it is difficult to make the rapid pressures too firmly. In regard to the second point, motion from the wrist with the arm held rigid is usually more accurate than whole-arm motion.

The advantages of this method are its mildness and painlessness, the fact that it is more rapid than any other effectual and safe method, the fact that no control site is necessary since the evidence of trauma due to the operation has disappeared before the first observation for an early reaction is made, and the fact that the vaccine is wiped off immediately so that the uselessness of a dressing is obvious to the person vaccinated.

2. What is the best vaccination dressing?

None at all. The ideal to be sought is to keep the site cool and dry so as to promote rapid formation of a firm crust and to avoid maceration and rupture of the vesicle. Heavy or tight clothing, perspiration, and even repeated washing with alcohol interfere with rapid desiccation. If necessary to prevent soiling of the clothing, a fold of sterile gauze may be attached to the garment, not to the skin. Occasionally a severe take may require a few days of antiseptic dressings; primary vaccinations should be inspected about the fourteenth day to insure that desiccation is proceeding properly. There is no objection to a light sterile dressing for the first few days after vaccination provided the arm is under constant competent surgical attention and maceration is prevented, but such provision is seldom assured.

3. Are there any objections to vaccination on the leg?

Yes. Leg vaccinations are exposed to more moisture and to more contamination from street dust than vaccinations at the region of the deltoid insertion. On account of blood stasis, primary leg vaccinations in adults are often accompanied by a purplish discoloration and result in a large, slowly healing ulceration; they usually cause tem-

porary disability. Vaccination on the arm when performed by the multiple-pressure method described above causes no disfigurement; the resulting vaccination scar is definite and typically pitted for inspection purposes, but hardly noticeable otherwise except as a "sanitary dimple."

4. *Is early surgical treatment of the vaccination vesicle satisfactory, such as opening and applying antiseptics?*

Yes; provided constant, competent care is exercised thereafter until healing is complete. However, the maximum immunity is not obtained until the red areola has reached its greatest diameter and begun to fade.

5. *Are any other methods of vaccination and treatment satisfactory?*

Any method is satisfactory which insures that the vaccine is deposited in the deeper layers of the epidermis with not more injury and over no greater an area than by the pressure method (not longer than one-eighth inch or 3 millimeters in any direction), and which avoids poulticing the developing vaccination. With any scarification method, to secure the maximum number of "takes" possible with the virus used, the vaccine should be rubbed in with the side of the scarifier or with a sterile toothpick for at least 15 seconds. Dr. Charles Armstrong has rightly suggested that even after open scarification the vaccine be immediately wiped off following this rubbing in, to avoid softening of the skin or subsequent maceration from the glycerin.

6. *Are there any objections to the intracutaneous injection of diluted vaccine virus?*

Yes; it is likely to be more painful than the method described above and in many instances even in good hands the injection will be subcutaneous rather than intracutaneous; subcutaneous applications of smallpox vaccine give reactions which are different from ordinary vaccinia and are not to be differentiated from reactions following other injections, so that one is never sure of the potency of the vaccine being used.

7. *How may the various reactions following smallpox vaccination be differentiated?*

By observation two days after vaccination and twice later, about four and eight days after vaccination, and by the cooperation of the person vaccinated to observe when the maximum reaction is reached. With a reaction of immunity, which indicates full protection against smallpox, the broadest redness is reached and passed in 8 to 72 hours after vaccination. This redness is accompanied by a slight elevation of the skin, which can be felt by passing the finger lightly over the vaccinated area. With the accelerated or modified vaccination or

vaccinoid, which indicates partial immunity, the broadest redness is reached and passed in 3 to 7 days after vaccination. With a typical primary vaccination, indicating absence of immunity to smallpox prior to this vaccination, the zone of redness, rather narrow from the third to the seventh day, begins a sudden spread about 7 days after vaccination, and reaches its broadest diameter in 8 to 14 days after vaccination, rapidly disintegrating and disappearing thereafter. These three types merge into each other, all gradations being found in practice. Differentiation into the three types is based on the time of broadest redness. The prompter the maximum the higher is the immunity. The vesicle of a typical vaccinia, and of many vaccinoid reactions, has a turbid, whitish appearance, but if properly cared for does not become a true pustule and dries up and heals promptly after the height of the reaction is reached. The characteristic pitted scar is red at first and gradually becomes white. Scars of vaccinoids are much less marked, and reactions of immunity usually leave no scar. All three of the types are successful vaccinations, provided the smallpox vaccine was fresh and strong. All three not only indicate the grade of the previous immunity, but increase the immunity as well. All other results, where proper technique was used, indicate deficient vaccine. Every vaccination should give a reaction.

8. *What untoward results from vaccination are to be looked for?*

With aseptic technique and a small insertion site which is kept dry and cool, the great majority of vaccinations go through their typical course and heal promptly if the crust is left undisturbed. The freest possible access of air currents and the natural friction of the clothing seem to promote firmness and rapid crust formation in the superficial skin layer of the vesicle. Particular care that all precautions are taken should be exercised in *primary* vaccinations, as Surg. Charles Armstrong has pointed out.

Rarely, due possibly to skin bacteria which can not be removed by the preliminary cleansing, the vesicle will become purulent and extend beyond its normal diameter, which is not over three-eighths of an inch (10 millimeters) greater than that of the insertion site, the drying up of the vesicle and the fading of the areola being thereby delayed. Opening of the pustule and the temporary application of some strong antiseptic such as mercury bichloride solution should be practiced if this takes place; as soon as a fair-sized areola has formed, the maximum immunity against smallpox has been attained, and the use of an antiseptic will not diminish the vaccinal protection. In general, temporary moist dressings are to be preferred to powders or ointments. Occasionally the vesicle may soften or accidentally rupture, or the crust be knocked off, in which case also temporary dressings may be indicated, but the formation of a firm unprotected crust should be favored as soon thereafter as possible. For some

infants a roomy sleeve fastened to the neck and wrist may be useful to keep out the fingernails.

Accessory vesicles around the vaccination site may in some cases be caused by too vigorous cleansing of the skin prior to vaccination. The virus may also be transferred to scratches or other skin lesions giving rise to distant vesicles.

True generalized vaccinia practically never occurs. Eruptions at about the time of the maximum reaction or later are not at all infrequent. The earlier eruptions are likely to be morbilliform, some simulating the skin lesions of measles very closely. The later eruptions are more like erythema multiforme. These incidental eruptions are not troublesome after their diagnosis is understood, and they disappear promptly without treatment.

The four most common failures in vaccination, from virus of insufficient potency, are a total lack of any reaction, a sluggish imperfect reaction not conforming to any of the three types described in the answer to question 7, an early reaction similar to a reaction of immunity in those who should give a vaccinoid, and the spurious reaction variously known as the keloidal, the mulberry of Scheult, or the paravaccine of von Pirquet. This last is a reddish or purplish papule looking somewhat like granulation tissue, rather slow in appearance and often persistent; it gradually disappears without treatment.

To guard against complications use aseptic technique, insertion-sites not more than one-eighth of an inch (3 millimeters) in diameter, keep the arm dry and cool, and (in first vaccinations) inspect after 9 to 14 days.

To guard against failures use fresh vaccine that has been kept very cold, and in case of doubt as to potency, vaccinate at more than one site, keeping each site of the minimum size.

9. How can one tell whether the vaccine used is of full potency?

A fair test that the vaccine is of full potency is that when properly applied it gives 100 per cent of vaccinias (typical "takes") in every application on at least 100 previously unvaccinated individuals. A more practical test is that it should give more than 50 per cent of vaccinoid reactions in persons who have been vaccinated or have had smallpox over 10 years previously and immunity reactions or typical vaccinias in the remainder; a much smaller number of individual vaccinations will give a good idea of the potency of a batch of vaccine by this test.

10. How cold should smallpox vaccine be kept?

The colder the better; well below freezing, if possible. Ice-box refrigeration is not cold enough for this purpose. Smallpox vaccine can not be injured by freezing as can serums and other vaccines.

Even a whole day out of cold storage, in addition to the necessary transportation from the manufacturing laboratory, may produce detectable deterioration in potency. Smallpox vaccine which has been out of cold storage so that it gives only about 80 or 90 per cent of successful vaccinations on previously unvaccinated individuals may be satisfactory in ordinary outbreaks of smallpox or in routine vaccinations, but in the presence of severe smallpox, or when reactions of immunity are to be observed, the vaccine should be obtained direct from the manufacturer and kept below freezing. In an electric refrigerator the smallpox vaccine should be kept in an ice-making compartment. Next best to storage below freezing is placing the vaccine in a metal or glass container which presses against a block of ice. If a vacuum bottle is used for transporting smallpox vaccine, the inside of the bottle should be packed with ice around the vaccine. Fortunately, severe outbreaks of smallpox tend to occur in cool weather, and cause sufficient demand for the vaccine so that it is shipped very directly from the manufacturing laboratories and is used rapidly. In the presence of severe smallpox, when there is uncertainty as to the potency of the vaccine, vaccination should be performed at more than one site, at least an inch apart, preferably with vaccine from different sources. Batches differ in their keeping qualities, but in recent years smallpox vaccine has with uniformity been found to be satisfactory as it leaves the manufacturer.

11. *Does a red, slightly raised area observed at the site of vaccination 48 hours after vaccination is performed necessarily indicate that the person vaccinated was immune to smallpox?*

No. There are three other possibilities:

(a) The most frequent of these is that the vaccine used had been weakened by time or temperature, so that, while still able to give the reaction described above, it did not go on to the production of a more marked reaction (vaccinoid) as would a vaccine of full strength if used on the same person. Ordinary ice-box refrigeration is not cold enough for the storage of smallpox vaccine which is to be used in testing immunity.

(b) Accelerated reactions (vaccinoids) usually give at early inspection (second day) the appearance described above, which is similar to that of a reaction of immunity. Thus, even if an early reaction is observed, subsequent observation, as on the fifth or seventh day, is necessary to determine whether the reaction was that of immunity, with its maximum diameter of redness reached in less than three days, or an accelerated reaction (vaccinoid) with later maximum. Even a vaccinoid reaction, however, indicates some immunity. Some true vaccinia may show an early reaction, especially if there have been previous unsuccessful attempts at vaccination.

Early reactions are more clearly apparent with the multiple pressure method than with other noninjection methods on account of the absence of injury to the true skin and the consequent absence of an obscuring traumatic reaction. Temperature changes, skin irritation, and other conditions may cause fluctuations in the diameter of the reaction, and there may even be an almost entire subsidence, giving rise to two maxima. In this case the later maximum indicates the true character of the reaction. The only safe rule for determining which of the three types of reaction occurred is repeated observation, as explained in the answer to question 7.

(c) The trauma due to the mere mechanical act of vaccination may cause enough irritation so that the redness persists at the time of the early 48-hour observation, independently of any specific reaction. To obviate falsely reading such redness as a reaction of immunity, it is necessary either to treat another site, as a control, with exactly the same degree of trauma, but without applying the vaccine, or, preferably, to use a method such as the "multiple pressure," which leaves no traumatic reaction after six hours to obscure faint reactions of immunity.

An early reaction can be called a true reaction of immunity only when pure smallpox vaccine has been used and these three other possibilities have been eliminated.

12. In the reaction of immunity is the grade of immunity indicated by the amount of the reaction?

No. The time after vaccination within which the local area of redness and infiltration of the skin reaches its maximum and begins to subside, and not the amount of this redness and infiltration, is the index of immunity. The quicker the maximum is reached and passed the higher is the degree of immunity indicated. The amount of the reaction depends on the skin reactivity of the person vaccinated and not on the grade of immunity. It is probable that any reaction which is marked within 24 hours will reach its maximum in less than 72 hours and therefore would constitute an immune reaction, but some of the most highly immune persons give the smallest reactions.

13. May not the reaction of immunity be an ordinary protein reaction such as is given, for example, by pollen proteins?

The protein reactions as shown by the usual skin tests (not subcutaneous) have an altogether different time relation from that of the reaction of immunity to smallpox. The former are rapid, appearing and reaching their maximum within about one-half hour, while the reaction of immunity to smallpox reaches its maximum in not less than 8 hours after vaccination and usually in more than

24 hours after vaccination. The protein reaction has faded before the reaction of immunity has begun to appear.

14. How often should one be vaccinated against smallpox?

Ordinarily, once in every 5 to 10 years, so that a maximum protection is maintained without the inconvenience at any time of a reaction more severe than the immunity reaction, except for the original primary vaccinia. Vaccination of infants is attended with less general reaction and fewer complications than vaccination of older children, so that vaccination is advisable as soon after birth as practicable, preferably before teething. Unless tight underclothing is worn over the arm, winter and spring are more suitable seasons than the warmer parts of the year.

Though young babies often require a more potent vaccine than others to insure a successful "take," there are four advantages to be gained by vaccinating a child during infancy rather than waiting until later; first, the "take" is apt to be milder and freer from the dangers of complications, such as tetanus; infantile vaccination usually gives rise to no inconvenience whatever; second, it tends to make the secondary vaccination, required at school age, a much milder affair than if the school vaccination were primary; third, protection against smallpox is gained for the preschool, runabout years; fourth, the scar of an infantile vaccination fades more completely than scars of primary vaccinations performed later. Provided the subsequent revaccinations result in vaccinoids or immune reactions, as may be expected, one thereby secures lifelong complete protection against smallpox without any severe reaction at any time and with only an inconspicuous scar.

Immunity afforded by vaccination is lost by different individuals at different rates. The ability to ward off an attack of smallpox may be compared to proficiency in a foreign language. Such proficiency may be first acquired during early life and lost gradually, more rapidly in some individuals than in others. Some individuals need to be vaccinated more often than once in five years to maintain full protection and thus always secure as the result of such vaccination merely an immunity reaction. Others may be vaccinated less frequently than once in 20 years and still maintain high immunity. It is a good plan to be revaccinated whenever one can be assured of a fully potent virus being used, so that the resulting reaction can be interpreted with certainty as showing a definite grade of immunity. On the basis of such a reaction, with the knowledge of the individual's previous vaccination history, one can often advise as to how frequently in the future that individual should be revaccinated.

The chance of taking the disease varies with the intensity of exposure and with the severity of the strain of smallpox to which one is exposed, as well as with the individual susceptibility. Those health officers who are continually exposed may need more frequent vaccination than the public at large. There is some evidence to show that infants and members of the colored races tend to lose their immunity more rapidly than others. A primary vaccination with one successful revaccination, or even a single successful vaccination, will, as a rule, protect throughout life from the milder forms of smallpox, but this is far from being true in the severer outbreaks. Second attacks of smallpox are rare, but do occur. If there is danger of exposure to a severe form of smallpox, all persons who have not been vaccinated within one year successfully, that is, with vaccine known to be of full potency, should be vaccinated.

15. *Does the degree or length of immunity following vaccination depend on the size or number of scars?*

To some extent, but not enough to make it worth while to undergo the inconvenience, the retardation of healing, and the risk of infection from a vaccination insertion larger than the smallest one which will insure a successful "take." Immunity depends much more on the recency of vaccination with potent virus than on the size or number of vaccinations at any one time.

16. *What are the contraindications to vaccination?*

In general, skin diseases, particularly eczema, are the only conditions which will justify school attendance and at the same time be contraindications to routine vaccination. This is on account of the danger of diffuse vaccinia from carrying the vaccine into the open lesions of the skin disease, or the danger of contaminating the vaccination site if the skin lesions are purulent. Patients with such diseases as tuberculosis are in nowise harmed by properly performed vaccination. Acute infectious diseases may cause a vaccination "take" to be delayed or atypical, but are not in themselves contraindications in case of possible exposure to smallpox. There is a curious relation in leprosy which tends to cause the lighting up of leprosy lesions during the course of the vaccination, but which may promote more rapid healing thereafter. Serious lymphomatous diseases, including lymphatic leukemia, may be made worse by vaccination.

17. *Will a nonimmunized person contract smallpox if exposed to the disease?*

By no means uniformly. Exposure to smallpox, especially to the milder forms, without contracting the disease frequently occurs and is no definite evidence of immunity. The number of cases of smallpox among the unprotected persons in contact with patients suffer-

ing from the disease is very much less than 100 per cent.

18. *Does the failure of a vaccination to "take" indicate protection?*

No. Differences in skin receptivity may occur independent of the condition of the individual as regards true immunity. For example, very young infants are not so easily vaccinated as older children, yet they are susceptible to smallpox and when successfully vaccinated give a typical vaccinia. Some individuals may be resistant, in the same way, to a lot of vaccine which gives "takes" generally in other individuals, but are not immune against smallpox when exposed, nor against vaccination when a fully potent lot of vaccine is used.

19. *How long after exposure to smallpox is it worth while to be vaccinated in order to hope that the attack may be warded off?*

In some smallpox hospitals every person is vaccinated on admission, to guard against the danger from exposure in case of error in diagnosis. Successful vaccination performed on the day of exposure will almost give complete protection against the smallpox attack, and vaccination up to a few days before the onset at least makes the attack milder than it would otherwise have been. Vaccination during the few days before onset will allow the vaccination and smallpox eruption to develop simultaneously without either influencing the other.

The successful development of a vaccination performed after the eruption has appeared is commonly held to be incompatible with the diagnosis of smallpox. Vaccination may, however, rarely appear to be successful if performed as late as the fourth day of the eruption, and it is astonishing how soon after smallpox or vaccination some exceptional individuals lose their immunity to vaccination. Three circumstances may cause confusion in regard to coincident smallpox and vaccinia: A vaccination performed in good time to prevent the smallpox attack may have been done with vaccine somewhat under full potency, and development of the typical vaccinia may be abnormally delayed until stirred up by the oncoming smallpox, or the vaccine may have been entirely impotent, and the developing eruption of variola may appear first at the irritated vaccination site, simulating true vaccinia. A late vaccination may in the same way result in a localized variolous patch at the vaccination site, or the late vaccination may give a modified or immune reaction due to the increasing smallpox immunity.

The discussion given above applies to primary vaccination. If the individual has some immunity from a previous vaccination the secondary vaccination may be protective though performed a somewhat longer period after exposure.

20. *What are the most important points in the diagnosis of small-pox?*

The diagnosis of smallpox may in some cases be difficult for the most experienced, but, in order of their importance, the most important diagnostic points are the distribution of the eruption, the individual lesions, the course of the disease, and inoculation tests. Of these four points the first two are of especial value because they are immediately available at first inspection of the patient. On account of its contagiousness, smallpox should be diagnosed as promptly and as certainly as possible. The characteristics of the distribution are the most uniformly valuable of all the criteria of diagnosis and are useful at almost any stage and in almost any case. Even in the mildest cases, with only a very few lesions, a count of the number on each part of the skin surface will usually give the clew to the correct diagnosis. It is to be remembered, however, that smallpox is a general disease, and that the eruption is symmetrical and not local.

The usual distribution of the smallpox eruption, general and in detail, and the character of the individual lesion is shown by the following table (modified from T. F. Ricketts) of differences between the smallpox eruption and the chicken-pox eruption.

SMALLPOX	CHICKEN POX
(a) Favors prominences, extensor surfaces, and surfaces exposed to irritation; tends to avoid protected surfaces, flexures, and depressions.	(a) Is distributed indifferently in general, though not infrequently the eruption is especially thick over some particular area of the skin where there has been irritation.
(b) The forearms and wrists have a thicker eruption than the upper arms.	(b) The proximal part of the limbs have more of the eruption than the distal.
(c) Most abundant on face, most scanty on abdomen and chest.	(c) The abdomen and chest are covered as thickly as the face or more thickly.
(d) More abundant on the back than on the abdomen.	(d) The abdomen has as many lesions as the back.
(e) More abundant on the shoulders than across the loins, and on the chest than on the abdomen.	(e) The distribution is indifferent as regards these regions.
(f) The eruption favors the limbs, and generally the arms, next to the face.	(f) Tends to avoid the limbs.
(g) Except when modified naturally or by previous vaccination the lesions are deep-seated and have an infiltrated base.	(g) Unless they have become infected, the solitary lesions on the more protected parts of the body are superficial and the base is not infiltrated, so that the entire lesion tends to collapse on pressure.
(h) The solitary lesions on the more protected parts of the body are generally circular in outline.	(h) The lesions frequently have an irregular outline; when they lie near a flexure they are apt to be oval or elongated.
(i) The lesions tend to be all of the same sort at the same time, or, if they are different, the smaller the lesion and the nearer it lies to the face the more advanced in development it should appear to be. In cases of modified smallpox the lesions are likely to vary greatly in size.	(i) Lesions at various stages of development may be found simultaneously, irrespective of their location or size.

The above description applies solely to the lesions of the characteristic eruption of smallpox, which go through the stages of papule, vesicle, pustule, crust, and scar, and not to the early rashes, erythematous or purpuric, which are seen rarely during the febrile

stage preceding the real smallpox eruption, and which may in the most severe toxic cases constitute the only eruption prior to death.

Any case of purpura or hemorrhage with fever is likely to be smallpox, and should be so considered as regards isolation, and immediate vaccination of "contacts," until another diagnosis is clear.

Otherwise presumptive diagnosis, before the characteristic eruption, can be made only in case of an acute febrile onset about 12 days after known or possible exposure to smallpox.

In very severe cases or in debilitation from any other cause the lesions of the true smallpox eruption are often imperfectly filled out.

The *course* of the disease, with the gradual but continuous progress of each individual lesion, is perhaps the most definite criterion in smallpox diagnosis, but unfortunately requires prolonged observation. The incubation period, from effective exposure to onset, is usually 8 to 18 days, tending to be longer with the milder strains. There are one to five days of febrile symptoms before the eruption, making the total time from exposure to the beginning of the eruption about 14 days. The eruption is papular for 1 to 4 days, vesicular for 1 to 4 days, pustular for 2 to 6 days, and the crust which forms falls off about 14 days after the first sign of the lesion, leaving a red, finely pitted scar which very gradually becomes white during the ensuing months or years. Lesions appear first on the more exposed or irritated surfaces, as the forehead, face, and hands, and usually appear last on the lower extremities, perhaps several days later. In general, the more severe the case the slower the progress of the lesions, while mild cases may go through their course rapidly and leave practically no scars.

The inoculation of a rabbit's cornea with the contents of the vesicles or pustules, followed by enucleation of the eyeball 40 to 72 hours after inoculation, fixation in strong sublimate alcohol, and examination for the characteristic whitish papules and the microscopic Guarnieri bodies in the corneal tissue (Paul's test) is the most useful laboratory procedure in the diagnosis of smallpox. This also consumes valuable time and, furthermore, has an element of uncertainty on the dangerous side—that is, the atypical cases of smallpox (atypical by reason of the stage at which they are seen or by reason of their modified character) are likely to give negative Paul reactions causing a dangerous implication of security.

Though smallpox is unquestionably many times more frequent in the unvaccinated than in those who have had even a single vaccination, it is believed that neither the vaccination history nor the presence of scars should be given diagnostic weight. The unreliability of such a criterion is especially evident in virulent outbreaks of the disease.

21. *What effect does previous vaccination have on smallpox?*

If recent, the vaccination will protect against the disease entirely.

If the protection is not quite complete, on account of the vaccination having been performed too long before, the toxic early stages of the disease are the first to come out from under protection, and the resulting illness may have a fairly severe febrile onset for two or three days, though the following eruption be scanty and the indisposition trivial. The purpuric, uniformly fatal, form of smallpox is the most difficult to prevent by vaccination, and cases of this form, without a true smallpox eruption, may occur in persons with a fairly good vaccination history. The incidence of cases of this form depends on three factors—inherited predisposition, severity of the strain of smallpox, and immune status (remoteness of last vaccination).

If the protection is even less in degree, insufficient to cause much reduction in the number of smallpox lesions, the individual lesions themselves may still be modified by the vaccination of long before, so that they are smaller or more diverse in size and more superficial, with a resulting lessened severity.

As a result of all these modifications, in attack, in number of lesions, and in the character of the lesions, vaccination lowers the death rate from smallpox per 100,000 population even more than it lowers the incidence rate.

22. *Is there another contagious eruptive disease, intermediate between smallpox and chickenpox in severity (variously called alastrim, milk pox, amaas, or varioloid varicella) which might be mistaken for either of these two diseases?*

No. Outbreaks of smallpox occur of all grades of severity, some with a mortality of 70 per cent among those attacked and some with a mortality of 0.01 per cent. Since 1896 a mild form has been increasingly prevalent in the United States and countries in communication with the United States, having a fatality of about 0.1 per cent among the unvaccinated. The strains of the disease present just previously had been much more severe, and from time to time outbreaks are now occurring with a fatality rate of about 30 per cent in the unvaccinated. Each of these strains in general breeds true to its respective type, and mild cases contracted from severe give rise in turn to severe and fatal cases. There is no definite grade of severity or of fatality that we can consider characteristic of smallpox, and it is probable that almost all of the epidemics called "alastrim," etc., have been mild forms of smallpox.

All forms of smallpox immunize against each other and may be prevented by the same vaccination. Exposure to a severe form is much more likely to give rise to infection than exposure to a mild

form, and it takes a higher grade of vaccinal immunity (more recent vaccination) to protect against a severe strain than against a mild strain. In moderately well vaccinated communities, such as Germany, epidemics of mild type are entirely prevented and outbreaks of severe type much diminished. On the other hand, in poorly vaccinated communities where isolation is nevertheless practiced, such as England and the greater part of the United States, mild strains spread more diffusely than severe, because they are not taken so seriously by those attacked nor by the public at large, and because the attack is not severe enough to keep the patient in bed and isolated. The mildness of the form of smallpox commonest at present is one reason for endeavoring to make preventive vaccination as harmless and as mild as possible.

23. Is vaccination alone a sufficient weapon for fighting smallpox?

No. Prompt recognition and rigid isolation of the cases, as well as the tracing of "contacts" should also be carried out to stop the spread unless the outbreak is very mild and in thinly settled regions. Cases, and even fatalities, occur in every severe epidemic among persons who were vaccinated in good time but with vaccine found, too late, to be of insufficient potency; such cases and fatalities also occur among persons thought to be protected by successful vaccination performed years previously. This presumption of protection, upon reconsideration apart from the fact that smallpox was contracted, is found to be based upon mistaken or ill-considered evidence. Probably the most infective stage of smallpox is the early stage, when lesions are present in the mouth, nose, and throat. "Return" cases, contracted from cases released too early from hospitals, are unusual, but the crusts are infectious, and patients should not be discharged from isolation until the skin, including the soles of the feet, is free from the primary crusts of the eruption. This may be within three weeks after the onset. The infection may be carried by inanimate objects which have been contaminated from cases of the disease, but such infection is not persistent.

Epidemics can not be stopped by isolation without vaccination nor prevented without required vaccination.

A FATAL CASE OF FOOD POISONING CAUSED BY FRIED OYSTERS CONTAMINATED WITH A PARATYPHOID B. BACILLUS

A chief pharmacist, a chief carpenter, and a chief boatswain, who were in Washington on leave for the purpose of testifying before a committee of Congress, took luncheon together at a well-known restaurant in the city. All three ate fried oysters and had symptoms of food poisoning. The chief pharmacist died.

The chief boatswain felt nauseated almost immediately after eating the oysters. He left the table, vomited, and felt weak and depressed, but recovered in seven or eight hours. The chief carpenter was taken sick about half an hour after eating. He vomited and passed several watery stools. He took a large dose of magnesium sulphate shortly after symptoms developed. He considered that he had recovered from the poisoning in seven or eight hours.

The chief pharmacist became ill about one hour after eating the oysters. At first he did not seem to be as sick as either of his companions, but later it was apparent that he was severely poisoned and a civilian physician was called to attend him in his hotel room. He died about 11 hours after symptoms developed.

The symptoms in his case were those that may be expected from the ingestion of toxins produced in food by bacilli of the meat-poisoning group. The onset was sudden, with nausea and weakness. He was chilly. Later great prostration was noted. He was restless and had continuous pain in the muscles of his legs; also frontal headache. He had no pain in his stomach and no intestinal colic.

He was not seen by a medical officer of the Navy before death. His body was removed to the United States Naval Medical School, where autopsy was performed by Lieut. Commander John Harper, Medical Corps, United States Navy. The indicated bacteriological study was made by Lieut. Commander James E. Houghton, Medical Corps, United States Navy. A white mouse which was inoculated intraperitoneally with 0.5 cubic centimeter of dilute stomach contents died three days after inoculation. Cultures from the heart blood and spleen of the mouse revealed a bacillus which was identified subsequently as *B. paratyphosus* B. Cultures made directly from the stomach contents of the deceased officer gave growth of a bacillus identical with that recovered from the mouse. A guinea pig inoculated intraperitoneally with 0.5 cubic centimeter of an 18-hour broth culture died in less than 16 hours from diffuse peritonitis and septicemia. The microorganism was extremely toxic.

Identification of the bacillus as *B. paratyphosus* B. was confirmed by the department of bacteriology, United States Hygienic Laboratory. The microorganism was classified bacteriologically as *Salmonella schotmuelleri*.

Post-mortem examination in this case of food poisoning revealed no striking pathological changes. Microscopic examination of the stomach and organs did not show anything pertinent to the cause of death. Chemical examination of the stomach contents for possible poison was negative.

An investigation of the restaurant was made promptly by the health department of the District of Columbia. As might be

expected, with knowledge that the food eaten there was under suspicion, no conclusive evidence regarding the oysters was secured. It appears, however, from statements made by one of the employees, that the oysters served to the three officers were taken in part from a freshly opened can, but that some of the oysters used to fill the order were the last in another can. The practice was to dip oysters in egg and crumbs and hold for fried-oyster orders.

It appears that the restaurant, as a possible defensive move, sent some of the oysters to the bacteriological laboratory of one of the medical schools in the city for general bacteriological examination. The bacteriologist informed Lieutenant Commander Houghton that the oysters and oyster liquor examined by him showed a high bacterial count of *B. coli*. He did not attempt to isolate bacilli of the paratyphoid group.

These three cases suggest that in addition to the danger of contracting typhoid fever by eating uncooked oysters which have been taken from polluted water, there is also a definite food-poisoning hazard associated with cooked oysters contaminated by sewage-polluted water if the oysters are incubated at warm-room temperature long enough to permit multiplication of the bacilli with production of the characteristic and heat-resistant toxin in sufficient amount to cause the early onset of severe symptoms of poisoning. The heat applied in frying the oysters was not sufficient, in the fatal case at least, to destroy all the bacilli, but it hardly seems possible that quickly fatal poisoning could have resulted without the ingestion of preformed toxin. It is, of course, true that the oysters which caused poisoning in these cases may have been contaminated in the restaurant by a carrier in handling them and preparing them in readiness for calls for fried oysters. It could not be determined how long after preparation any of the oysters were held at a temperature suitable for incubation. Nevertheless, it is not necessary to assume that they were contaminated in the restaurant. The oysters were already contaminated, as indicated by the presence of members of the *B. coli* group. To kill a patron it was only necessary to provide an incubation period sufficient for the production of toxin.

**AN OUTBREAK OF FOOD POISONING IN THE WARDROOM MESS OF THE
U. S. S. "RICHMOND," CAUSED BY CHICKEN SALAD CONTAMINATED
WITH *B. ENTERITIDIS***

Nine officers who ate chicken salad at luncheon on board the U. S. S. *Richmond*, at Guantanamo Bay, Cuba, October 13, 1926, were poisoned. The outbreak was reported in detail by Lieut. Commander W. J. Agnew, Medical Corps, United States Navy,

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medical officer of the *Richmond*. The following account is based on his report and on a report of bacteriological findings submitted by Commander A. H. Allen, Medical Corps, United States Navy, senior medical officer of U. S. S. *Mercy*, to which the most severely affected officer was transferred for treatment. Some of the suspected chicken salad was also sent to the *Mercy* for laboratory examination.

Food eaten at the midday meal, October 13, 1926, was unquestionably responsible for the outbreak, and circumstances made it possible to eliminate as a possible cause every article but the chicken salad. Official rehearsal for short-range battle practice was held that day. Inasmuch as mess boys, cooks, and stewards were to be engaged in handling ammunition until a few minutes before the noon meal, it was decided to serve such food for luncheon as could be prepared before the rehearsal and quickly served afterwards.

Several chickens were drawn from the general mess supply and removed from the ship's cold-storage room at 9 a. m. October 12. These were allowed to thaw in the wardroom pantry until 2 p. m. the same day. They were then cleaned, washed, and boiled. After boiling they were cut up into small pieces suitable for a salad, placed in a porcelain bowl, and put into the wardroom ice box. That refrigerator is equipped with an electric refrigerating machine which, because of a mechanical defect, was not functioning at the time. Ice was used instead to keep the refrigerator cool. The box contained approximately 30 pounds of ice when the cut-up chicken was placed in it, and there were about 10 pounds of ice left when it was refilled the following morning, so the box was not without ice at any time. The refrigerator was not equipped with a thermometer at that time, but one has been kept in it since. Probably the temperature to which the chicken was exposed was not below 50° F.

On the morning of October 13 the wardroom steward boiled several eggs until they were hard-boiled, cut up a quantity of apples, and made mayonnaise dressing in the usual manner. He then prepared the salad by adding these articles to the chicken, placed it on three silver-plated platters, and put them in the refrigerator. In preparing the salad the steward did not notice any unusual odor.

After boiling, the chickens were handled only by the wardroom cook and the wardroom steward. Both men had been cautioned by the medical officer about cleanliness and the necessity for care in handling food. Cockroaches were present in the wardroom pantry, although few in number as a result of daily spraying with a disinfectant oil solution.

There were 24 officers in the wardroom mess of the *Richmond*, and there were present for luncheon that day 8 additional officers,

members of an observing party from the U. S. S. *Detroit*, making a total of 32 served. The chicken salad when served had a slightly disagreeable taste, which was thought to be due possibly to cold-storage eggs. Eleven *Richmond* officers and 5 *Detroit* officers ate various amounts of the salad. Six *Richmond* officers and 3 *Detroit* officers developed food poisoning. Symptoms in the first case appeared three hours after eating, and in all cases within five hours.

The officer who was most severely poisoned was taken ill suddenly at 3 p. m. with nausea, vomiting, and prostration. Shortly afterwards he began to have diarrhea. Apparently he had no pain except cramps in the abdomen. He was seen by the medical officer as soon as vomiting started. Prostration was sudden and marked. Because of violent vomiting, he was unable to retain medicines more than one or two minutes. Blood appeared in the vomitus after about an hour and a half. He had liquid bowel movements every three to five minutes, and about 5 p. m. he began to have bloody stools. At that time he was perspiring profusely, but complained of feeling cold and weak. His pulse, which had been strong, became rapid and weak. He was transferred to U. S. S. *Mercy*, and when admitted on board the hospital ship at 6 p. m. he was greatly prostrated and cyanotic. His pulse rate was 96 and the pulse was of fair tension. During the next hour he vomited five times, the vomitus consisting of bloodstained fluid and mucus. His bowels moved five times, the movements consisting of liquid brightly stained with blood. His temperature rose to 101° F. and his pulse rate to 126. The heart sounds were weak. He had no headache and no ocular symptoms. He was given sips of sodium bicarbonate water after 7 p. m. and 500 cubic centimeters of normal saline solution was administered intravenously at 10 p. m. One-quarter of a grain of morphine sulphate was given hypodermically at 7.30 p. m. He rested comfortably during the night, passed no urine, and had no recurrence of vomiting or diarrhea. About 2 p. m. the following day he passed one bloody stool, but otherwise recovery was uneventful.

The previous history of the patient is of interest in certain respects. He had had chronic stomach or intestinal disorder for several years, and chronic gastritis or ulcer of the stomach or duodenum was suspected. He had been very careful about his food and at times had not eaten regular meals. For three days before the attack of poisoning he had eaten very little food. At the luncheon in question he ate a large quantity of the chicken salad. That is probably the reason why he was more severely poisoned than the others.

Cultures made from his vomitus and stools, obtained on board the *Mercy*, showed the presence of *B. enteritidis*. Cultures of his urine were negative.

Cultures made from the sample of chicken salad which was forwarded to the hospital ship showed the presence of *B. enteritidis* in great numbers.

The other eight officers who had symptoms of poisoning were affected as follows: From three to five hours after eating the salad they were seized with nausea, vomiting, and weakness, followed by diarrhea. Abdominal cramps and purging began a few minutes after the onset of vomiting. One patient developed general muscular cramps several hours later. No changes in pulse, respiration, or color were noted in these cases. Normal and subnormal temperatures were recorded and profuse perspiration was noted. All patients, except the officer transferred to the hospital ship, recovered within 24 hours.

**REPORT OF AN OUTBREAK OF FISH POISONING ON BOARD THE U. S. S.
"CALIFORNIA"**

By J. L. NEILSON, Captain, Medical Corps, United States Navy

At 12.10 p. m. September 9, 1926, the "head boy" of the ward-room mess attendants informed the medical officer that many boys had been made sick by food eaten at the noon meal between 11 and 11.30 a. m., and he presented for inspection a piece of cooked fish which he judged to be the cause.

In appearance and odor the fish was not peculiar, but a small flake taken from the interior of the presented piece when placed on the tongue produced almost instantly an intense burning sensation, which was followed in a few seconds by tingling and then numbness. The sensation produced suggested a drop of strong lye water followed by a drop of cocaine solution.

All but one of the sick boys were found at once, as all mess attendants had gathered in the wardroom pantry for the purpose of serving the officers' noon meal. Treatment was promptly inaugurated. One of the affected mess attendants, whose duties were performed in the laundry, came to the sick bay of his own volition about 15 minutes later. In all cases the stomach was emptied and magnesium sulphate was administered.

The specimen of fish mentioned was sent to the hospital ship *Relief* by special boat, with a brief note explaining the circumstances and requesting analysis. No other specimen was obtainable, as all waste had been disposed of and the mess gear used had been washed and stowed.

Personnel affected.—Poisoning was confined entirely to ward-room mess attendants. There were 23 wardroom boys, and all were on board for the noon meal the day the outbreak occurred. They

had been engaged in their usual duties during the forenoon. Half of them had been ashore and half had remained on board the afternoon and evening of the previous day. Several remained ashore all night and returned just in time for breakfast September 9. Two of the boys were negroes and the rest were Filipinos. All but the steward and one cook partook of the same food at breakfast, but at the noon meal all did not eat at the same mess or partake of the same food. Four, in the wardroom pantry, ate food prepared for the officers' meal. Two ate in the wardroom galley, taking "snacks" of food prepared for the wardroom mess, together with boiled rice prepared for the mess attendants' table. Seventeen, all Filipinos, ate at the regular mess attendants' table. The 6 who did not eat at that table were not affected. Of the 17 who were at the table, 13 were sick. Of the latter, 6 had been on liberty the evening before and 7 had not, but all had eaten breakfast on board. No evidence pointed to any food eaten for breakfast.

The food.—It was so evident that the food which caused poisoning had been served only to those who ate the noon meal September 9 at the mess attendants' table that inquiry along other lines was only casual or for purposes of verification. The food served consisted of "fresh" mackerel, boiled rice, white bread, butter, and coffee. The 17 boys were served approximately equal portions of all items on the menu, and all partook of each item. All items were served in abundance except the fish. The quantity of fish available was insufficient for usual portions, and each helping was comparatively small. With the exception of the fish, all the boys ate about equal quantities of the different foods. Four of the boys took but one taste of the fish. Two ate all that was served them. The others ate various amounts.

Investigation showed there was nothing suspicious about the rice, bread, coffee, or butter. There was something very definitely wrong with the fish. The word "fresh" is used merely to indicate that the mackerel was not salted, smoked, canned, or otherwise preserved.

The fish was purchased by the wardroom steward on the morning of September 8 direct from a licensed fishing boat which was discharging its catch at the municipal wharf of San Pedro, Calif. It was cleaned under the eye of the steward at the time of purchase. It was served in the officers' mess at noon September 8, when it was pronounced perfectly fresh and was greatly enjoyed. No one was made ill by eating it at that meal.

An excessive quantity had been purchased, and part of it, uncooked and not cut up, was saved to use for the mess attendants' noon meal the following day. The cook on duty directed a mess boy to place the fish on ice in the wardroom ice box. As nearly as could be ascer-

tained, the boy forgot the fish and did not remember it until about 4 o'clock in the afternoon, at which time he placed it on ice as directed. Thus the fish remained in the warm galley for approximately six hours. At 10 a. m. September 9 the cook found the fish on top of the ice box. No information could be obtained to show how long it had been exposed there to the warmth of the compartment in which the ice box stands. By smell, sight, and feel the cook decided the fish was safe to use. There was a doubt in his mind, however, and he took the precaution to smell it as it was cooking. He detected nothing that was even suspicious, so cooked and served it. He did not taste it.

At the first mouthful the "boys" at mess noticed that the food "burned" the mouth and that the sensation was not caused by heat. By trying the different foods they quickly determined that the fish was the article at fault. Four of them ate no more of the mackerel but partook freely of the other foods. Most of the others ate sparingly of the fish, thinking it was highly spiced, but after consuming various quantities finally stopped because of the disagreeable taste. The severity of illness appeared to be in direct proportion to the amount of fish consumed. Two boys ate all or most of their portions of fish as well as all the other food. They were hungry, and they thought it was all right to continue to eat, for others were eating, and the burning sensation seemed to be only temporary. Those two boys were more affected than any of the others.

Bacteriological findings.—The specimen of food sent to the *Relief* was part of the cooked fish. Cultures showed a long, slender Gram negative, aerobic bacillus which produced acid but no gas on the various sugars. Several subcultures were made, but the micro-organism was not definitely identified.

Symptoms.—The poison produced a local effect by direct contact with the mucous membrane and a general effect after absorption. The latter was paramount, and was divided into two distinct stages—first, stimulation; second, depression.

The local effect consisted of intense burning, followed in a few seconds by tingling and then numbness. These sensations occurred wherever the flesh of the fish touched the mucous membrane, in the mouth, pharynx, esophagus, and stomach. Coupled with the "burning" sensation there was an acrid taste. All patients had these local symptoms.

General symptoms were experienced only by the 13 boys who swallowed the fish. The stage of stimulation started about 30 minutes after beginning to eat and lasted 30 to 45 minutes. The first symptom noticed was a feeling of fullness in the head. Very soon after that the face commenced to burn and there was throbbing in the head. The face and neck were markedly flushed, giving the

Filipinos a rich copper color. One of them said, "My head commenced to swell up and bump and the other boys turned red." The medical officer observed some of the boys in what was evidently the latter part of this stage, about one hour after the beginning of the meal. Faces and necks were still slightly flushed. Arterial pulsation was plainly visible in the neck, and the pulse was full, bounding, and regular. Observed pulse rates were 120 to 150. Only two patients showed elevation of temperature. The temperature was 99.2° F. in one case and 99.6° in the other.

Most of the patients were just entering the stage of depression when seen by the medical officer. The most prominent subjective symptom at this stage was headache, steady and crushing in character, and mainly frontal in location. In the worst cases it seemed to be "all over," although probably a little more severe "behind the eyes." Headache was present in all cases. The two patients who were most severely affected developed pain and tenderness of muscles. Lassitude and a feeling of weakness were prominent symptoms developing after headache commenced.

Objective symptoms at this stage were pallor, subnormal temperature, and slow pulse. Pulse rates were 40 to 60, with the pulse weak but regular. Eyes were sensitive to light. In the two bad cases the pupils were somewhat dilated and they reacted slowly to light.

Vomiting did not occur in any of the cases until after the administration of an emetic, or for about one hour, and in one case, nearly an hour and a half. Since vomiting followed exhibition of the emetic and ceased promptly it was considered not to have resulted from the poison.

Diarrhea did not occur in any case until about four hours after eating the fish or about three hours after taking two full doses of magnesium sulphate given 15 minutes apart. The greatest number of bowel movements reported was five or six. It is assumed they resulted from the salts and not from the poison.

Chilliness was neither observed nor reported. There was no evidence of even transient paralysis.

Eleven of the 13 patients were feeling fit for duty within six hours after they were first seen. Some of them still felt a mild degree of lassitude, but otherwise appeared and felt normal. One patient was put to bed because of severe and persistent headache, pain and soreness in muscles all over the body, and slow, weak pulse. He was one of the two who had eaten nearly all of his portion of fish. He was well the next morning. One patient left without being seen and it was assumed he had recovered as others had. The following morning he failed to report for duty. He was sent for and found to be sick. He complained of headache, pains in

muscles all over the body, and pain in his stomach. He was pale and had a weak pulse which varied in rate, without apparent cause, from about 60 to 100. He was put to bed and given no additional treatment but was fed milk every four hours. The following day he was given two one-thirtieth grain doses of strychnia, four hours apart, hypodermically. After the second dose his pains and headache rapidly disappeared. The next morning he felt perfectly well and was anxious to return to duty. None of the patients subsequently showed evidence that the poisoning had left any ill effect.

It was concluded that the cause of poisoning was fresh mackerel in which bacterial poison had developed as the result of improper storage in the uncooked state. The microorganism producing the poison was not demonstrated.

AN OUTBREAK OF FOOD POISONING CAUSED BY BOILED SMOKED TONGUE

By W. A. FORT, Lieutenant Commander, Medical Corps, United States Navy

A party of 21 men from the U. S. S. *Milwaukee* was sent to the rifle range on the naval station at Guantanamo Bay, Cuba, for small arms practice, October 12, 1926. Sandwiches made of smoked tongue were provided for lunch. All members of the party ate sandwiches and 14 were poisoned. No other member of the crew was affected. A few of the men who were taken ill had purchased ice cream or soda at the fleet canteen after landing, but, excluding the bread of the sandwiches, smoked tongue was the only article of food eaten in common by all. The ship's menu for the previous 48 hours was not investigated further than to determine that no smoked tongue had been served.

The first indication of poisoning appeared about two and one-half hours after lunch at the rifle range. The first patient became ill about 2.30 p. m. Ten men had reported sick by 5.30 p. m. Two with milder symptoms were discovered about 7 p. m., and the following morning two more men reported as feeling nauseated during the night.

Eight men were known to have eaten from the same lot of smoked tongue with no ill effects. Seven were members of the rifle range party and the eighth was a ship's cook, who prepared the sandwiches.

In general, the first indication of illness was cramplike pain in the abdomen, sudden in onset. The patients became acutely ill within a few minutes. When seen by the medical officer about three hours after the onset of symptoms in the earliest case, the patients, of which there were 10 at that time, were prostrated and suffering acutely with pain. The pain, at first spasmodic in character, later became continuous. Five patients were nauseated, but did not vomit.

In the other cases, vomiting followed shortly after the initial symptom of abdominal cramps and lasted from one-half to three-quarters of an hour. In five cases, profuse watery diarrhea began less than an hour after the initial symptom. Three patients developed diarrhea later. It is believed all would have had diarrhea if treatment with calomel and salts had been delayed. Three patients had slight fever, but the temperature was not over 100° F. in any case. Neither headache nor chilliness was mentioned by any patient. Some mentioned soreness in the abdomen. Prostration was sudden and marked from about the time when vomiting began, and lasted for about 10 hours, or until calomel and salts had cleared the intestinal tract. The pulse rate was 90 to 100 in all cases except those with mild symptoms. Most of the patients complained of "foul" taste in the mouth. There was excessive salivary secretion.

No toxicological or bacteriological examination was made of vomitus or stools.

The lot of smoked tongue in question was purchased in New York, N. Y., under regular Navy contract. It passed the usual inspections in the navy yard and at the gangway before being placed in cold storage on board ship. The tongues were packed in boxes.

After leaving New York the smoked tongue was served about once a week for five weeks with no ill effects. Those which caused the outbreak October 12 were among tongues that had been taken from cold storage and boiled for two and one-half hours October 8. After boiling, they were allowed to cool and were then placed in the chill room. Most of them were served for the crew's lunch October 11 without causing ill effects. All smoked tongue remaining on board was examined and found to be of good appearance and odor. A sample of one of the tongues which had been used for the offending sandwiches was obtained and sent to U. S. S. *Mercy* for bacteriological examination. The specimen was reported to have yielded in culture a microorganism belonging to the enteritidis-paratyphoid group of bacilli.

The possibilities of bacterial infection appeared to resolve themselves into the following groups:

1. Contamination prior to being received aboard—
 - (a) At slaughter house or packing house.
 - (b) En route.
2. Contamination after being received aboard the *Milwaukee*—
 - (a) Prior to boiling.
 - (b) After boiling.

Contamination on board prior to boiling is a remote possibility. After weighing the evidence the writer is of opinion that the meat which caused poisoning was contaminated with a *B. enteritidis* group

microorganism after it was boiled October 8. Bacterial growth probably continued in the chill room, which was kept at a temperature of 36° to 38° F. long enough for the production of sufficient toxin to cause symptoms. It appears that two or three tongues were left out of the chill room for some time October 11 while the crew's lunch was being prepared, and then returned. That further incubation period very likely accelerated the growth of bacilli.

REPORT OF AN OUTBREAK OF FOOD POISONING CAUSED BY CHEESE

The outbreak, which occurred on board U. S. S. *Reuben James*, was reported in detail by Commander G. E. Thomas, Medical Corps, United States Navy, and Lieut. Commander F. W. Carll, Medical Corps, United States Navy. The following is a summary of the report:

The suspected food was cheese, served in the general mess at supper, October 15, 1926. Other articles served were salmon salad, creamed potatoes, bread, jam, and tea. Doubtless food eaten at that meal was responsible for poisoning, but bacteriological proof was not obtained. Samples of the cheese were examined in the laboratory of U. S. S. *Mercy* for bacilli of the *B. enteritidis-paratyphoid* group with negative results. It appears that no other microorganisms were considered. The cans containing the salmon served as salad were opened not more than one-half hour before serving. All cans were in good condition. There were no "swells" and the fish was of good appearance, odor, and taste. The mayonnaise dressing was prepared about one-half hour before serving. It hardly seemed possible that the salad was responsible for poisoning. No part of it was obtainable for examination.

The cheese which was thought to be responsible for the outbreak was obtained from the U. S. S. *Dobbin* the day before it was used. It had a rather strong odor and taste, and it could not be cut as it crumbled under the knife into small granular masses. The cheese was part of a lot of 1,400 pounds received in New York. Two weeks before this outbreak of poisoning occurred, about 20 cases of acute gastroenteritis among members of the chief petty officers' mess of the U. S. S. *Dobbin* were attributed to the cheese. The symptoms were violent vomiting with moderate prostration and diarrhea of less than 24-hours duration. When the outbreak occurred on board the *Reuben James*, all but 400 pounds of the cheese had been widely distributed to all messes on board the *Dobbin* and to ships of the Fourteenth Squadron. It was concluded that only an occasional head of the cheese was poisonous. To prevent further occurrences the remainder was destroyed.

The outbreak on board the *Reuben James* was widespread, affecting all messes except the officers' mess in which cheese was not served. Of 105 members of the crew, 40 had symptoms of poisoning. The first man to be affected was taken ill about three hours after the evening meal or about 9 p. m. By midnight, 37 other men had appeared for treatment and 2 men became ill after midnight. All had completely recovered by noon the following day. The vessel was at sea en route from Haiti to Guantanamo Bay, Cuba, when the outbreak occurred. The crew was incapacitated to such an extent that a bonus run had to be abandoned and medical assistance summoned. The possible effect of an extensive outbreak of poisoning in time of war is suggested.

Thirty men who were not affected were selected at random and questioned the next morning. Twenty-seven of the 30 ate the salmon salad, 2 ate some of the cheese but no salmon, and 6 ate small amounts of the suspected cheese and everything else on the menu. Twenty-two did not eat any of the cheese.

All of the 40 men who were taken sick ate various quantities of the cheese and of all other articles of food served for supper October 15.

The foods served for the noon meal October 15 were beefsteak, stewed tomatoes, baked potatoes, bread, butter, and coffee; and for breakfast, apples, fried eggs, and bacon, bread, butter, and coffee. The beef was of good appearance and taste. It was of the same lot issued by the *Dobbin* to all destroyers of the Fourteenth Squadron.

Clinically, the symptoms of poisoning were much the same in all cases but were of different degrees of severity. The onset of symptoms was sudden in all cases. All patients had nausea and vomiting, abdominal cramps, and diarrhea. A few complained of headache and were more or less prostrated. One man stated he had eaten some of the cheese when it was brought on board October 14, and that he felt sick four or five hours afterwards with gastrointestinal symptoms, but he had not thought it necessary to report the circumstances until the outbreak occurred.

Editorial note.—The possibility that microorganisms other than bacilli belonging to the *enteritidis-paratyphoid* group may render food toxic should not be overlooked. Two outbreaks of food poisoning, caused by a streptococcus in cheese, were reported by B. A. Linden, W. R. Turner, and C. Thom, microbiological laboratory, Bureau of Chemistry, United States Department of Agriculture, and published by the United States Public Health Service in Public Health Reports, August 6, 1926.

The first outbreak, reported in March, 1925, occurred at Biddeford, Me., and involved 9 persons. Poisoning was attributed to eating an imported Albanian cheese. The second outbreak consist-

ing of 22 cases which occurred in Kansas City, Kans., was reported in February, 1926. The cheese was American cheddar manufactured in Wisconsin.

The symptoms in both outbreaks were similar—pains in the stomach, severe vomiting, diarrhea, dull expression, and rapid pulse.

In each instance, among the bacteria contained in the sample of cheese forwarded to the microbiological laboratory, the streptococcus believed to be the toxin producer responsible for the outbreak was found. The report states:

The sample submitted from the second outbreak was taken directly from the cheese held responsible for the poisoning. Aerobic plates on dextrose agar made from this sample showed 27,000,000 bacteria per gram of cheese. Of these approximately 20,000,000 were cocci which were morphologically and culturally identical with those isolated from the Albanian cheese. A number of examinations failed to reveal the presence of members of the paratyphoid-enteritidis group of organisms. Accordingly the organism from the Albanian cheese was reisolated and the two strains were carried parallel in further experimental work.

The microorganism was spherical, regardless of the type of media used for its growth, 0.8 to 1.2 micron in diameter, nonmotile, Gram positive, regardless of the age of culture, and generally arranged in pairs or short chains. Growth on dextrose agar was rapid, beaded, raised, smooth, glistening, grayish, or opaque white, in streak culture. Colonies on dextrose agar plates showed growth within 24 hours at 37° C. Colonies were small, round, grayish white, amorphous, undulate-edged, slightly raised, with small, grayish white, lens-shaped subsurface. There was uniform growth in gelatin stab culture without any liquefaction. Uniform turbidity without sediment was produced in bouillon. Flocculent growth occurred in Dunham's solution without formation of indol. Uniform cloudiness was produced in nitrite broth with no reduction to nitrates. In litmus milk reduction of the litmus was evident after 24 hours incubation at 37° C. Acid production was evident at the end of 48 hours and soft coagulation after three to four days. No growth occurred on potato. Gas was not produced in bouillons containing various fermentable substances. Acid production in milk after long incubation amounted to 0.5 to 0.6 per cent acid, calculated as lactic acid. Bouillon containing dextrose, maltose, lactose, sucrose, salicin, mannite, rhamnose, and glycerol showed acid production, but with raffinose and inulin no acid was produced.

With regard to oxygen requirement, the organism was facultative. The optimum temperature for growth was 37° C.; the minimum, 16° C., and the maximum, 42° C. With regard to the effect of ordinary Pasteurization, experiments indicated that 142° F. has some effect, but for complete sterilization of cultures 145° F. with 30 minutes' exposure is necessary.

Milk contaminated with this streptococcus was quite uniformly toxic for cats, producing diarrhea within four hours when incubated for three days.

Chopped-beef medium acted as an excellent substratum for growth of the organism, but repeated experiments with six cats failed to show that the contaminated beef was toxic. The beef was incubated for 24 hours at 37° C. and there was a luxurious growth of the organisms on it. Flasks of meat and bouillon were inoculated with retransfer after each three days of incubation to the sixth transfer, when the cultures were fed to cats without causing them any disturbance. The meat cultures were then transferred back to milk and retransferred at three-day intervals six times. The sixth series of milk cultures were fed to three cats and all three animals developed diarrhea in approximately eight hours. No sickness resulted except when milk was used as a culture medium.

**AN OUTBREAK OF FOOD POISONING CAUSED BY CORNED-BEEF HASH AT
THE UNITED STATES DESTROYER BASE, SAN DIEGO, CALIF.**

An outbreak of food poisoning which occurred at the United States destroyer base, San Diego, Calif., December 27, 1926, was reported in detail by Lieut. James J. O'Connor, Medical Corps, United States Navy.

Epidemiological study showed that all foods could be dismissed from consideration as a possible cause of poisoning except corned-beef hash served for breakfast December 27 and fresh-meat hash served for supper December 26. The circumstantial evidence left practically no doubt that the corned-beef hash was responsible.

About 50 per cent of the men attached to the base were away during the Christmas holidays. Approximately 155 men ate breakfast there December 27. Fifty-eight men had symptoms of poisoning. First symptoms developed about two and one-half hours after the hash was eaten. All men who were affected stated they had eaten hash. Thirty-five patients were transferred to the United States naval hospital, San Diego, Calif. The remaining 23 had milder symptoms. Seventeen men were taken ill within three hours after eating breakfast, 20 between three and four hours, 20 between four and five hours, and 1 in the fifth hour.

Nearly all the patients were pale, cyanotic, and slightly shocked. The onset of symptoms was sudden in all cases. In 53 cases the first indication of illness was nausea and vomiting; in 5, diarrhea. All patients complained of abdominal pain. Three described the pain as continuous; the others spoke of cramps. Vomiting occurred in all but two cases. In 6 cases vomiting continued for 48 hours. Early diarrhea occurred in 5 cases, but all patients had from 3 to 10 loose

or watery and foul-smelling bowel movements. No blood was seen in any stool. Twenty-five patients had severe chills. Fever was observed in only 6 cases and the elevation of temperature was slight—99° to 100° F. Two patients had subnormal temperature—96.8° and 96.7° F. Thirty patients complained of headache, which was described as frontal by 22, while 8 stated that the pain was chiefly in the occipital region. Sixteen patients complained of general aching and soreness. Slight prostration was noted in practically all cases. In four, severe prostration developed quite suddenly. Three patients complained of dry mouth, and 18 had excessive salivary secretion. A continuous bitter taste was generally mentioned. Thirteen of the patients spoke of black spots before the eyes and blurring of vision.

Of the 35 cases transferred to hospital, blood counts were found normal in all but 3, in which the white counts were, respectively, 15,100, 13,200, and 13,400.

All but four men who still complained of weakness and tenderness in the abdomen were fit for duty within 48 hours. In general, the cases were mild and recovery was rapid and complete.

A sample of the suspected food could not be obtained for laboratory examination, all of it having been disposed of as garbage before illness developed in any case. Cultures were made from the stools of four patients in hospital. In three cases cultures were negative, but in one, bacilli identified as belonging to the enteritidis-paratyphoid food poisoning group were isolated.

Regarding the hash, it was learned from mess cooks that the canned corned beef used had been removed from the cans, ground up, and exposed in the warm galley for approximately two hours during the afternoon of the day preceding that when the hash was served for breakfast. After the exposure to a temperature favorable for bacterial growth the ground meat was placed in a refrigerator. Where a considerable quantity of ground meat is placed in a pan and then put in a cold place, many hours probably elapse before the meat other than that at the surface cools down to a temperature that prevents multiplication of paratyphoid bacilli.

Although it has previously been considered quite safe to return meat that has possibly been contaminated, to a cold-storage room, this, and another outbreak which has recently occurred in the Navy, indicate that such a procedure is by no means safe.

There was no indication that any of the men who handled and prepared the food had or had had diarrhea or any intestinal disturbance during the preceding two months.

The corned beef was in bright new tins and apparently it was in excellent condition. Five cans of the same lot were cultured with

negative results at the naval hospital, both upon opening the cans and after exposing the meat in the open laboratory for 24 hours.

Doctor O'Connor reached the conclusion that the outbreak of food poisoning was caused by hash composed of canned corned beef, potatoes, and onions, the meat component of which was prepared the day prior to use, contrary to published instructions and established orders, and that the meat was contaminated by human carrier or by vermin and then subjected to incubation favorable for the production of a sufficient quantity of toxic material to cause the manifestations of the mild food poisoning that resulted.

**REPORT OF POISONING BY TRINITROTOLUENE AMONG ENLISTED MEN
ENGAGED IN TRANSFERRING T. N. T. FROM STORAGE TO U. S. S.
"NITRO"**

By T. A. FORTESCUE, Lieutenant Commander, Medical Corps, United States Navy

Between August 25 and September 8, 1926, 2,500 tons of cast T. N. T. were transferred from the United States naval ammunition depot, Hingham, Mass., to the U. S. S. *Nitro*. The ammunition was lightered out to the ship. It was in the form of 9,663 depth charges, 4,629 mine charges, and 2,561 drifting mines.

These charges had been in storage for a considerable period of time, and a small quantity of a dark brown, oily liquid had separated out from the T. N. T., covering the external surfaces of the containers. Such a liquid consists of isomers of T. N. T. with a small percentage of lower nitrotoluols. No loss of efficiency results from the presence of the liquid, which is considered a normal condition of cast crude T. N. T. after a period of storage. But, like T. N. T. itself, the liquid is quite poisonous. It volatilizes rapidly in hot weather and is freely absorbed by the skin and to a lesser extent by the lungs. This exudate, when smeared over containers, gets on the hands and clothing of the workers and greatly increases the danger of poisoning.

In this instance no civilian stevedores were employed. Working parties from the ship's company, from the U. S. S. *Florida*, and the U. S. S. *Raleigh* were detailed to do the loading, the mixed detail numbering 53 men. The working parties included many very young and physically immature men who had recently enlisted in the Navy. They were wholly inexperienced in this sort of work. As the loading went on, many replacements from the ship's company had to be made. Although only about 50 men worked at any given time, the total number employed was about three times that many.

The following precautions were taken against poisoning:

(a) Men from the *Florida* and *Raleigh* brought with them canvas suits, rubber boots, and thick rubber gloves. The *Nitro's* men wore

dungaree suits, heavy canvas gloves with leather palms, and leather shoes.

(b) Adequate bathing facilities were provided and all men were instructed to wash thoroughly before eating lunch, and each day upon finishing work to take a complete bath and change into fresh clean clothes.

(c) To insure a complete change for every man, all were ordered to appear at the sick bay after changing clothes at the end of each day's work, for inspection as to physical condition as well as clothing.

(d) All men assigned to the work were instructed to report promptly should they have headache, vertigo, thoracic pains, etc.

(e) The detail as a whole was split into two working parties and these alternated between the holds and barges.

After two or three days the canvas suits became deeply stained, dirty, and cumbersome. Being of little or no protective value they were discarded. The rubber gloves were punctured and torn, and they were discarded in favor of leather-palmed gloves, which at least were more durable. Rubber boots afforded no more protection than leather shoes, as the plantar surfaces of the feet of those who wore them were deeply stained. In fact, the volatilized T. N. T. penetrated with equal freedom any of the protective garments worn.

On the third day of the loading, five or six men appeared at the sick bay complaining of smarting eyes, dizziness, and pain in the chest and abdomen. No one man complained of all these symptoms, but all complained of two or more symptoms, the most common being headache and vertigo. Daily thereafter a half dozen such cases were seen. Toward the end of the loading period, two men became momentarily unconscious while working in a partially filled hold. One man developed a papular eczematous eruption on the dorsal surfaces of his hands and wrists. The lesions disappeared rapidly after he was relieved from the work. About 3 per cent of those who had symptoms of poisoning showed the typical T. N. T. cyanosis.

In all cases there was a tinge of color, varying from yellow to light brown, over the entire body, the more exposed parts, such as hands, face, and neck, being more deeply stained. All patients exhibited tachycardia with pulse rates from 90 to 120. The urines were deeply stained and Webster's test showed the presence of trinitrotoluene. The blood was not examined in all cases, but there were no cellular changes in several.

The first thing done in the way of treatment was to prevent further absorption of the poison. After that, elimination was aided.

Men who showed indications of poisoning were removed from the work and required to wash thoroughly and make a complete change of clothing. Magnesium sulphate was administered in massive doses. In practically all cases this treatment was followed by the disappearance of all symptoms in from a few to 24 hours. Other treatment given was purely symptomatic in character. Saline solution gave the greatest relief to patients showing mild conjunctivitis. Atropine sulphate most quickly relieved abdominal and chest pains. Except for the two men who became momentarily unconscious while working, toxic symptoms were very mild in all cases and disappeared entirely within one day after change of detail. It was not deemed necessary to admit to the sick list any but the two patients specially mentioned above.

The following conclusions were reached:

(a) Rubber gloves, canvas gloves, boots, shoes, canvas suits, and dungaree suits, all seemed to afford about the same amount of protection, which was very little. No difference was detected in physical condition or in the frequency of disability between men who wore one thing and those who wore another. Masks were not available, so no observation could be made as to their protective value.

(b) Disability seemed to be caused largely by T. N. T. fumes due to volatilization of the material. This was made evident by the difference in the physical condition of men who worked in the holds as compared with those at work on the lighters. About 70 per cent of the men who had symptoms of poisoning came from the holds where the volume of fresh air was less and the fumes were more concentrated. From the start the details were arranged so that each man worked below only every other day.

(c) No severe or really serious case of poisoning was observed.

(d) The nature of the cast T. N. T. handled was such as to involve heavy or arduous work and at least a dozen of the men detailed to load the cargo had not yet matured physically, so they were altogether unfitted for such work. Sheer physical fatigue was undoubtedly an important contributory factor in many of the cases.

(e) About 50 per cent of the men employed showed symptoms of poisoning at one time or another.

(f) The most important protective measure appeared to consist in frequently relieving the T. N. T. details. It is believed that with a sufficient number of men to insure two complete working parties which could alternate with each other every two or three days, much of the poisoning could be avoided.

(g) The very young seem to be more susceptible than the older men and should not be detailed for duty of this sort.

AN EPIDEMIC OF JAUNDICE IN SAN DIEGO, CALIF.

During the month of October, 1926, 15 cases of acute jaundice occurred among the 2,189 officers and enlisted men at the United States Naval Training Station, San Diego, Calif., and 2 additional cases occurred in officers' families. The disease responded readily to treatment. The senior medical officer reported that jaundice apparently followed attacks of acute catarrhal fever. In view of the epidemiological distributions of influenza during the year it is possible that the disease spoken of as catarrhal fever was in reality influenza.

During the same period an epidemic of jaundice with 182 reported cases was occurring among civilians in the city. The outbreak was reported by the department of public health, city of San Diego, in its monthly bulletin for November, 1926, as follows:

During the month of October, 182 cases of jaundice were reported to the health department, the first case occurring on or about October 2. The disease was widespread throughout the city.

From 1920 to 1923, 300 known outbreaks of jaundice occurred in the United States, of which 200 occurred in New York State in 1921 and 1922.

The local epidemic was characterized by sudden onset, marked gastrointestinal disturbances, anorexia, vomiting, constipation, but in a few cases dysentery. Pronounced pain in the back and limbs, abdominal pain, usually epigastric, and fever varied from subnormal to 105. Jaundice appeared as early as the fourth day and in some cases persisted for six weeks.

A survey was made in regard to food supply, milk supply, and occurrences of public gatherings, but it was apparent that no common source of infection could be determined excepting that all patients were affected by a common water supply. A very few cases were affected with respiratory symptoms, but the largest percentage showed no respiratory infection at all.

Over 70 per cent of the cases occurred in children between the ages of 10 and 19. After the 1st of November a few cases were reported which showed evidence of being contact cases.

In a recent epidemic of typhoid and paratyphoid in one of the California cities many of the early cases were jaundiced.

Jaeger described a bacillus of the *Proteus* group in a garrison epidemic at Ulm in 1892.

A colon bacillus and other members of hog-cholera group in Germany.

Cases reported in French literature describe etiology as colon bacillus septicemia.

A paratyphoid infection began with liver and kidney symptoms. First phase, jaundice, albuminuria, considerable uremia, nervous phenomena, vomiting of blood, without any fever. Second phase presented all symptoms of paratyphoid infection, confirmed by blood culture.

It is probable both phases of disease introduced by same organism.

Noguchi reported on an epidemic in Middletown, Ind., in which one child gave a weak positive Pfeiffer reaction with *Leptospira icterohemorrhagica*, all the rest negative. They had been drinking water from an old well and when the supply was cut off the epidemic terminated.

Certain forms of leptospira found in stagnant water may produce a mild leptospiral infection in epidemic form.

In the swimming pool epidemic at Burg, Germany, 84 per cent of 76 affected developed jaundice.

Laboratory examinations both in the municipal and State laboratories failed to isolate any organism of the above-mentioned groups.

CONCLUSIONS.—That this epidemic jaundice was of gastrointestinal origin, with an incubation period of approximately from 4 to 28 days; that at some time, approximately September 29, for a short time only, there was a mild pollution of the city water supply, which was widely distributed throughout the city, and very likely we might assume that the infecting origin was of the colon bacillus group. However, no definite conclusions can yet be formed as to the actual cause of the disease.

The epidemics of jaundice referred to above, which occurred in New York State in 1921–22, were reviewed in the United States NAVAL MEDICAL BULLETIN for September, 1923, page 380. Children especially were attacked in New York as well as in San Diego. The peak of the epidemic was in November and December, 1921. The epidemiological study, which was made by sanitary supervisors, New York State Department of Health, under the direction of Dr. E. C. Godfry, director of the division of communicable diseases, related to 700 cases. The study was reported by Huntington Williams, M. D., Dr. P. H., in Health News, published by the department of health, May, 1923.

Although the cause of the State-wide epidemic was not definitely established, Doctor Williams was of the opinion that the infection was spread by droplets of mouth and nose discharges or by personal contact. He considered that the causative agent was probably some unrecognized microorganism or virus carried in the nasopharyngeal secretions of persons ill of the disease.

Comparatively little is known about the epidemiology of jaundice. More complete recording of cases, and especially of outbreaks as they occur, is in order for possible use in future studies. Studies in the field as well as in the research laboratory may be expected to add to epidemiological knowledge of infections characterized by jaundice.

HEALTH OF THE NAVY

The general admission rate, based on returns for diseases and injuries occurring in October, November, and December, 1926, was 545 per 1,000 per annum. The corresponding rate for the first quarter of the year was 546; for the second quarter, 476; and for the third, 540. Based on experience in recent years, the expected rate from all causes would be 529 per 1,000 for the last quarter.

The admission rate from disease was 470, which is a little greater than the expected rate, 420 to 450. The admission rate from accidental injuries, 73 per 1,000, was definitely higher than for cor-

responding periods of previous years, but the increase was possibly due in part to more complete reporting of minor injuries involving little loss of time.

The incidence of acute respiratory diseases was a little greater than in corresponding months of the preceding two years, largely due to increased numbers of cases notified as catarrhal fever. The slight increase may have some significance, since epidemics of influenza were occurring in some cities of the United States during the autumn and outbreaks began to occur in the Navy shortly after January 1, 1927. During January and February about 3,000 cases of influenza were reported.

The disease first appeared in epidemic form on board ships whose crews had been in contact with foci of infection in New York City and near-by communities. Two destroyers, the *Reuben James* and the *Lawrence*, after leaving New York for Guantanamo Bay, Cuba, were forced by a number of cases of influenza to put into Hampton Roads, Va., where most of the patients were transferred to the naval hospital, Norfolk, Va., via the naval operating base, January 6. Men from the destroyers appear to have introduced that particular epidemic strain of influenza into the naval training station and into all other activities at the base. In all, more than 600 cases occurred in the course of a month among personnel of the training station. Influenza became epidemic in Washington, D. C., later in the month, but the disease was probably not imported through naval channels. The following ships in Atlantic waters, other than the destroyers mentioned above, reported outbreaks in January:

Ship	Cases	Port in which probably infected
U. S. S. Texas.....	89	Hampton Roads, Va.
U. S. S. Milwaukee.....	34	New York, N. Y.
U. S. S. Richmond.....	30	Do.
U. S. S. Concord.....	65	Philadelphia, Pa.
U. S. S. Dobbin.....	39	Do.
U. S. S. Coghlan.....	31	Norfolk, Va.
U. S. S. Hopkins.....	24	New York, N. Y.
U. S. S. Antares.....	40	Norfolk, Va.
U. S. S. Bridge.....	34	Do.
U. S. S. Camden.....	70	New London, Conn.
U. S. S. Memphis.....	51	Villefranche or Algiers.

The U. S. S. *Seattle*, which was in New York, reported 116 cases of catarrhal fever in January. Probably in the main those were cases of influenza. It is also probable that certain organizations which reported a number of influenza cases accounted for other cases of influenza as catarrhal fever.

Influenza was probably epidemic in San Pedro, Calif., in January. The U. S. S. *Tennessee* reported 24 cases during the month. The same ship reported 86 cases of catarrhal fever between January 31 and February 25. The U. S. S. *Medusa* reported 33 cases of in-

fluenza early in February. About the same time 36 cases occurred on board the U. S. S. *West Virginia*. In the latter part of January and early part of February 15 cases notified as influenza and 126 as catarrhal fever developed at the United States Naval Training Station, San Diego, Calif. The U. S. S. *Mississippi*, which was at Bremerton, Wash., reported 46 cases of catarrhal fever in January. Early in February the U. S. S. *Pennsylvania*, also in Puget Sound, reported 39 cases of influenza. An outbreak of influenza probably developed at the United States Naval Training Station, Great Lakes, Ill., January 21. Up to February 1, 192 cases of catarrhal fever were reported.

During the last quarter of 1926 mumps became prevalent, 396 cases being reported as compared with an expectancy of about 70. Outbreaks have occurred since January 1, 1927, at the United States Naval Training Station, Hampton Roads, Va., with 123 cases, and at the United States Naval Academy, where 102 midshipmen were attacked in the latter part of January and February. Very likely the trend of mumps is now upward in various parts of the United States in the course of cyclic periodicity, especially along the Atlantic seaboard.

Twelve cases of cerebrospinal fever occurred during the last quarter of 1926 and 9 cases have been reported since January 1, 1927.

TABLE NO. 1.—*Summary of morbidity in the United States Navy and Marine Corps for the quarter ended December 31, 1926*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	74,803	38,243	19,415	113,046
All causes:				
Number of admissions.....	8,689	6,707	2,926	15,396
Annual rate per 1,000.....	464.63	701.51	602.83	544.77
Disease only:				
Number of admissions.....	7,499	5,771	2,530	13,270
Annual rate per 1,000.....	400.99	603.61	521.25	469.54
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	2,173	2,318	748	4,491
Annual rate per 1,000.....	116.20	242.45	154.11	158.91
Venereal diseases:				
Number of admissions.....	2,360	851	713	3,211
Annual rate per 1,000.....	126.20	89.01	146.90	113.62
Injuries:				
Number of admissions.....	1,144	925	396	2,069
Annual rate per 1,000.....	61.17	96.75	81.59	73.21
Poisoning:				
Number of admissions.....	46	11	0	57
Annual rate per 1,000.....	2.46	1.15	0.00	2.02

TABLE NO. 2.—Deaths reported, entire Navy, during the quarter ended December 31, 1926

		Navy			Marine Corps		
		Offi- cers	Mid- ship- men	Men	Offi- cers	Men	Nurse Corps
Average strength.....		8,507	1,687	82,966	1,186	18,229	471
Total							113,046
CAUSES—DISEASES							
Primary	Secondary or contributory						
Abscess, peritonsillar.....	Pneumonia, broncho.....			1			1
Antinoculation (typhoid).....	None.....			1			1
Appendicitis, acute.....	Abscess, liver.....			1			1
Appendicitis, acute.....	Peritonitis, general acute.....			1			1
Arteriosclerosis, general.....	Myocarditis, acute.....			1			1
Bronchitis, acute.....	Encephalitis, lethargic.....			1			1
Carbuncle, back.....	Pyemia.....				1		1
Cellulitis, face.....	do.....			1			1
Cellulitis, right leg.....	Septicemia.....			1			1
Cholecystitis, chronic.....	Embolism, cerebral (post-operative).....					1	1
Cerebrospinal fever.....	None.....			2			2
Do.....	Pneumonia, broncho.....			1			1
Carcinoma, rectum.....	None.....			1			1
Carcinoma, stomach.....	do.....			1			1
Dysentery, bacillary.....	Myocarditis, acute.....			1			1
Endocarditis, acute.....	None.....			1			1
Leukemia.....	do.....	1					1
Myocarditis, chronic.....	do.....	1		1			2
Nephritis, chronic.....	do.....	1		2			2
Do.....	Carbuncle, back of neck.....				1		1
Do.....	Pneumonia, broncho.....			1			1
Obstruction, intestinal.....	None.....			2			2
Pericarditis.....	Dilatation, cardiac acute.....			1			1
Pneumonia, lobar.....	None.....			1			1
Do.....	Serofibrinous pleurisy.....			1			1
Rheumatic fever.....	Endocarditis, acute.....			1			1
Syphilis.....	Poisoning, neoarsphenamine.....			1			1
Do.....	Dementia paralytica.....			1			1
Tonsillitis, acute follicular.....	Pneumonia, broncho.....			1			1
Tuberculosis, chronic pulmonary.....	None.....				1		1
Do.....	Tuberculosis, right hip joint.....			1			1
Do.....	Tuberculosis, pharynx, larynx and intestines.....			1			1
Do.....	Tuberculosis, chronic, intestines.....	1					1
Do.....	Pneumonia, broncho.....			1			1
Ulcer duodenum.....	Pneumonia, lobar.....				1		1
Valvular heart disease, combined lesions, aortic and mitral.....	Dilatation, cardiac acute.....				1		1
Valvular heart disease, aortic insufficiency.....	None.....			1			1
Unknown.....				1			1
Total for diseases.....		3		33	1	4	1
Total							42
CAUSES—INJURIES AND POISONINGS							
Asphyxiation, illuminating gas.....	None.....			1			1
Avulsion, right foot and right leg.....	Hemorrhage and shock.....			1			1
Burns, multiple.....	Psychosis, manic depressive.....				1		1
Contusion, abdomen.....	Pneumonia, broncho.....				1		1
Fractures, compound, skull.....				3			3
Fracture, simple, vertebra, cervical.....	None.....			1			1

TABLE No. 2.—Deaths reported, entire Navy, during the quarter ended December 31, 1926—Continued

		Navy			Marine Corps		
		Off- cers	Mid- ship- men	Men	Off- cers	Men	Nurse Corps
CAUSES—INJURIES AND POISONINGS—continued							
Primary	Secondary or contributory						
Injuries, multiple, ex- treme.	None	5		4		1	
Do.	Hemorrhage, traumatic, right femoral artery.			1			
Do.	Rupture, traumatic, right kidney and right lung.			1			
Intracranial injury	Alcoholism, acute			1			
Intraspinal injury	None				1		
Rupture, kidney	Hemorrhage and shock			1			
Wound, penetrating, ab- domen.	None			1			
Wound, penetrating, brain	do.			1	1	1	
Wound, penetrating, chest	do.					1	
Wounds, penetrating, head and chest.	do.			1			
Wound, penetrating, ab- domen.	Hemorrhage, traumatic, abdominal aorta.			1			
Drowning		2		7			
Total for injuries and poisonings		7		25	1	6	
Grand total		10		58	2	10	1
Annual death rate per 1,000, all causes		4.70		2.80	6.74	2.20	8.49
Annual death rate per 1,000, disease only		1.41		1.59	3.37	.88	8.49
Annual death rate per 1,000, drowning		.94		.34			
Annual death rate per 1,000, injuries		2.35		.87	3.37	1.32	
Annual death rate per 1,000, poisonings		0.00		0.00	0.00	0.00	

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by naval training stations:

Cumulative data

	Num- ber	Per cent of recruits received	Per cent of recruits reviewed
JAN. 1 TO DEC. 31, 1925			
All naval training stations:			
Recruits received during the period	9,385		
Recruits appearing before Board of Medical Survey	688	7.33	
Recruits recommended for discharge from the service	465	4.95	67.59
OCTOBER, NOVEMBER, DECEMBER, 1926			
U. S. Naval Training Station, Hampton Roads, Va.:			
Recruits received during the period	924		
Recruits appearing before Board of Medical Survey	25	2.70	
Recruits recommended for discharge from the service	25	2.70	100.00
U. S. Naval Training Station, Great Lakes, Ill.:			
Recruits received during the period	762		
Recruits appearing before Board of Medical Survey	12	1.57	
Recruits recommended for discharge from the service	12	1.57	100.00
U. S. Naval Training Station, San Diego, Calif.:			
Recruits received during the period	965		
Recruits appearing before Board of Medical Survey	64	6.63	
Recruits recommended for discharge from the service	44	4.56	68.75
U. S. Naval Training Station, Newport, R. I.:			
Recruits received during the period	742		
Recruits appearing before Board of Medical Survey	51	6.87	
Recruits recommended for discharge from the service	24	3.23	47.06

ADMISSIONS FOR INJURIES AND POISONING, FOURTH QUARTER 1926

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during the fourth quarter, 1926, is based upon all Form F cards covering admissions in those months which have reached the bureau:

	Admissions, October, November, and December, 1926	Admission rate per 100,000 per annum	Admission rate per 100,000, year 1925
INJURIES			
Connected with work or drill.....	960	3,397	3,343
Occurring within command but not associated with work.....	687	2,431	2,001
Incurred on leave or liberty or while absent without leave.....	422	1,493	1,049
All injuries.....	2,069	7,321	6,393
POISONING			
Industrial poisoning.....	23	82	25
Occurring within command but not connected with work.....	15	53	490
Associated with leave, liberty, or absence without leave.....	19	67	16
Poisoning, all forms.....	57	202	531
Total injuries and poisoning.....	2,126	7,523	6,924

Percentage relationships

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave, liberty, or A. W. O. L.	
	October, November, and December, 1926	Year 1925	October, November, and December, 1926	Year 1925	October, November, and December, 1926	Year 1925
Per cent of all injuries.....	46.4	52.3	33.2	31.3	20.4	16.4
Per cent of poisonings.....	40.4	4.7	26.3	92.2	33.3	3.1
Per cent of total admissions, injury and poisoning titles.....	46.2	48.6	33.0	36.0	20.8	15.4

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction," or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases, selected from October, November, and December reports, are worthy of notice from the standpoint of accident prevention:

Hatchway hazards.—A man fell through an open hatch which was left unguarded at night. Injury, lacerated wound of the leg. Loss of time, 7 days.

On board another ship a man fell through a hatch left open and unprotected by navy-yard workmen. Injury, contused wound of the head.

Hatch-cover hazards.—An improperly secured hatch cover fell on the hand of a man passing through. Injury, fracture of phalanx. Loss of time, 11 days.

Failure to put a hatch-cover pin in place resulted in the injury of another man when the cover fell. A lacerated wound of the hand required 96 days' treatment in hospital.

Another man incurred a fracture of a great toe by letting a box rest against a hatch cover which had been left half open and not secured. The cover closed on his foot. He was treated in hospital 7 days.

A man carelessly closed a hatch while another was coming up the ladder. Injury, compound fracture of a finger. Loss of time, 62 days.

While a submarine was submerging, an officer, in steadying himself, placed his hand on the knife edge of the "safety hatch." The cover fell, inflicting a compound fracture of one finger. Loss of time, 80 days to end of the year; final result not yet reported. The accident was attributed to fault of the safety device with which the hatch was equipped. It is understood that action has already been taken to prevent the occurrence of similar accidents.

Defective lines.—A defective line holding a boatswain's chair parted while a man was painting aloft, causing him to fall from a yard arm. Injury, lacerated wound of the face. Loss of time, 15 days.

A defective fall parted while a boat was being hoisted and a man's fingers were caught in a block. Injury, lacerated wounds. Loss of time, 15 days.

Hazards of working in double bottoms.—Three men were asphyxiated by "bilge gas" while working in double bottoms under a fire room in a battleship. All recovered. Loss of time in each case, 8 days. The patients were transferred to hospital.

Foundry hazards—Fumes.—A moulder was overcome by smoke and gas in a foundry on board ship. Loss of time, 3 days. The accident was attributed to inadequate ventilation resulting from failure to open hatches leading to the foundry.

Gasoline hazards.—A man was sleeping on the housing over a tank of gasoline. Another man lighted a match near the vent hole of the housing and an explosion occurred. The sleeping man, who was burned on the arms and neck, was disabled for 10 days.

A mess boy left gasoline, which he had been using for cleaning purposes, in an officer's stateroom. The officer accidentally dropped

a lighted match and the gasoline became ignited. He was severely burned on the arms and legs in attempting to put out the fire and was on the sick list 141 days.

A man was using gasoline for cleaning purposes in a wash room. A blacksmith, not knowing that gasoline was exposed near by, undertook to cool a red hot iron under a spigot in the washroom. The gasoline fumes ignited and the blacksmith, who received severe burns of the face and hands, was disabled 8 days.

While refueling a motor boat, a man received burns of a leg and foot, which disabled him for 21 days. Gasoline was ignited either by sparks from a cigarette or by a static discharge resulting from poor ground connection.

In an aircraft squadron a man undertook to solder a gasoline tank with an acetylene torch. The tank exploded and he received burns of the face for which he was treated in hospital 39 days.

Kerosene hazards.—A man was cleaning a lubricating oil tank with kerosene. He was burned about the face and arms when another man dropped a lighted match into the tank, causing an explosion. Loss of time, 3 days.

Unsafe practice.—A fireman was using a soldering iron and accidentally touched a 30-30 shell cap, causing it to explode. The medical officer reported that the accident was not due to negligence. He did not state the reasons for his conclusion. The exploding shell cap caused a punctured wound of the eye. The patient was treated in hospital 50 days to the end of the year. The end result has not yet been reported.

Careless handling of firearms.—Two sentries on post at different places shot themselves while handling loaded pistols. One shot himself through the hand and was on the sick list 97 days. The other was shot through the foot and was on the sick list 26 days.

A marine, member of a mail guard, carelessly handling an automatic pistol, shot himself in the foot. He was treated in hospital 14 days to the end of the year; end result not yet reported.

A man who was leaning against a 5-inch gun, upon which a loaded subcaliber gun was mounted, was shot through the forearm when another man carelessly pulled the trigger. The injured man was disabled 54 days.

Unsafe practice—Steam line hazards.—Two men were severely burned while removing a check valve from a main drain. As a result of failure to shut off the steam, the valve top flew out and live steam escaped. Both men received burns of the trunk, face, and arms. One was treated on the sick list 10 days and the other 5 days.

A man on board a destroyer was severely burned by steam while working on a pipe line from which the steam had not been shut off. He was treated in hospital 14 days.

Unsafe practice—Feed pump hazard.—A man attempted to tighten a bolt on a feed water pump without shutting it down. He incurred the fracture of a bone in his hand, which required 19 days' treatment on the sick list.

Unsafe practice—Power driven machine hazard.—A man was working at a lathe while wearing a jacket with loose unbuttoned sleeves. A sleeve was caught and his hand was drawn into the "dogs," causing a contused wound of the arm which disabled him for 7 days.

Flying particles—Lack of eye protection.—Two men at different stations were injured by flying particles while working with emery wheels without wearing protective goggles. A flying particle entered the eye of another man who was working at a drill press without eye protection. Time lost as a result of these accidents amounted respectively to 2, 5, and 10 days.

Lack of precaution in handling a railroad car.—Several men from a ship were on a flat car which was being moved in a navy yard. No one had been detailed to stand by at the brake wheel. The car got beyond control on a down grade and overturned on a curve. Four men were injured. Sick days were respectively 4, 9, 11, and 12.

Chemical agents, disinfectants, and drugs.—A patient in a naval hospital wrung out a mop which had previously been used in a strong solution of lye and had not been rinsed out. Injury, severe chemical burns of both hands which required treatment for 26 days.

A ship's cook, on duty at an outpost was injured when iodine mistaken for a solution of silvol was dropped in his eye. Loss of time, 12 days.

An officer on board ship mistook a bottle containing tincture of iodine for one containing a solution of argyrol and dropped some in his eye. The injury required treatment for 21 days.

A man in taking prophylactic treatment used a solution of bichloride of mercury by mistake. He was transferred to hospital where he remained under treatment at the end of the year.

A bottle of silver nitrate solution which had carelessly been left on a hatch grating tipped over. A man at work under the grating, upon whom the liquid fell, received chemical burns on the shoulders and abdomen, which required nine days' treatment on the sick list.

Lead poisoning incidental to chipping paint.—Ten cases of lead poisoning were reported during the past three months. There were only nine admissions during the calendar year 1925. Of the 10 cases recently notified, 2 were reported by one battleship. Poisoning, regarded as chronic, was ascribed to chipping paint in double bottoms. Exposure was considered to have been spread over a long period of time. One of the patients was treated on the sick list 25 days, and the other 37 days.

Exposure to lead-ladden dust while chipping paint in double bottoms during the course of two months, led to poisoning in a case reported by another battleship. The patient was treated in hospital 22 days.

Another battleship has recently reported 7 cases of lead poisoning, 6 of them due to chipping paint and 1 to applying paint. Symptoms were acute in 4 cases, and it was thought that inhaling dust was largely responsible. Days lost while the patients were undergoing treatment were, respectively, 35, 37, 40, 66, 66, 72, and 78.

These cases suggest that the hazards of lead poisoning associated with chipping paint are especially encountered on board battleships and that the risk of poisoning in chipping is greater than the statistics of the preceding two years seemed to indicate.



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TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,

Surgeon General, United States Navy.

PREFACE

NOTICE TO SERVICE CONTRIBUTORS

Contributions to the BULLETIN should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated, if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

U. S. NAVAL MEDICAL BULLETIN

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SPECIAL ARTICLES

SOME OBSERVATIONS ON AVOIDABLE DROWNING¹

By R. B. MILLER, Lieutenant Commander, Medical Corps, United States Navy

The most frequent cause of death in the naval service is drowning. This is not a surprising fact with respect to those who follow the sea perhaps, but it is an impressive one. The Annual Report of the Surgeon General of the United States Navy for 1925 brings this matter once more forcefully to our attention when we learn that 79 out of 498 deaths in 1924 were due to this cause—over one in every seven! During that year drowning was responsible for more fatalities than all the respiratory diseases combined. It resulted in more deaths than did heart disease of all varieties and greatly outranked all types of kidney disease in this respect as well. A perusal of the mortality statistics of the Navy for any period makes it evident that the year 1924 is not unique with respect to its casualty list from drowning, and it is evident that no factor concerned with the prevention of death in the naval service deserves greater consideration.

Continuous effort is maintained toward mechanical perfection, competent seamanship, and the various other professional considerations which tend to safeguard life. Everything possible is unquestionably being done in this direction. But what of the tragedy in which the inability of the individual to care for himself in the water is the responsible factor?

Swimming is futile in many emergencies, of course, and death is often inevitable. Yet a very considerable number of drownings unquestionably result directly or indirectly from a lack of knowledge of those facts or a lack of experience in those accomplishments with respect to the water and swimming which every Navy man should know and be able to utilize. It may appear superfluous to say that something of an adequate nature should be done toward decreasing this hazard in the face of a long-established provision intended to combat this danger. I am prepared to expect that many will

¹ From the Public Health Service, Haiti.

assume the measures at present in force to be sufficiently comprehensive in this respect. The continued existence of our present swimming "qualification" can be explained in no other manner. Yet I am convinced that considerably more can be accomplished and have set down the observations which follow as a consequence.

Our present conception of what is required to bring the personnel to a proper standard of fitness in the direction indicated, as expressed by our swimming "qualification," is hardly correct, even in principle. Somewhere along the line the fact that an ability to perform the mechanical maneuvers of a swimming stroke is of itself no assurance of safety in the water has been lost sight of, and our present "qualification" makes no allowance for this oversight. An expert swimmer, when properly so designated, is adept in assuring his safety in the water. He has acquired what I have designated *watermanship*,² for the purpose of this discussion, by experience; and by this term I mean the knowledge of those things over and above mechanical swimming which permits him to adjust himself to the various unfavorable conditions often encountered in the emergencies he meets and which gives him a discretion that enables him to avoid dangerous situations. An individual who has attained but a fair degree of mechanical swimming ability is devoid of these attributes. His experience has been too limited for their acquirement.

We attempt to assure ourselves that each individual has a measure of proficiency in mechanical swimming. Here we stop. Whether he eventually acquires adequacy in *watermanship* or not is a matter for conjecture. If he does, it is solely because of his own inclinations. Having once "qualified" he need not bother himself further in this regard unless he has a mind to. We assure ourselves only that he is able to swim a certain distance. After he has accomplished this standard test he is classed as a "qualified" swimmer. And what do we mean by such a designation? Exactly what is he qualified to do? Are we to assume that he is able to care for himself in the water in the emergencies he is likely to encounter? No experienced waterman would be led into any such assumption on the basis of such a test. And yet is not this the purpose of the "qualification"? Is it not the intention that such a test will give us some assurance as to the abilities of the individual in this respect? Can it be said by anyone with experience in such matters that this measure fulfills its purpose?

The fact that anyone is able to swim 50 yards or so means very little in any determination as to his general proficiency in the water. The fact that a ship's company is composed entirely of "qualified"

² The terms "waterman" and "watermanship" are used unconventionally in this discussion to refer to the group of accomplishments defined above.

swimmers is not a reassuring discovery when once the basis of qualification is understood. It gives no assurance that the individual will be able to remain afloat and within the area of possible rescue for an adequate length of time should an occasion arise in which his recovery from the water is delayed. More frequently than not it requires a considerably greater amount of time to effect a rescue than that consumed by the individual in his qualifying test.

In the recent disaster of the *S-51*, for example, rescue was considerably delayed, and there is good reason to believe that some of those fortunate enough to get free from the damaged craft were unable to remain afloat or within the radius of rescue for the required time. Reports indicate that the water was smooth and not cold. Apparently the tide was not running strongly and the visibility seems to have been good. Conditions might be considered to have been favorable to those not caught in the sinking submarine. It should have been no feat for a properly qualified waterman to have remained afloat and within the area of rescue for an hour or so under such circumstances. Barring injury as a direct result of the collision, at least several of the deaths occurring in this disaster could be properly credited to inadequacy in the matter of watermanship.

How many of those qualified according to our standards would be able to swim 50 yards or remain afloat for even a limited length of time under unfavorable conditions? (And how many naval accidents occur under favorable conditions?) Would a man so qualified be able to acquit himself properly in rough water? Would he be able to swim or remain afloat for even a limited time when fully clothed? (And how frequently is one accidentally thrown into the water in his bathing suit?) Would such a man be able to remove his clothes while in the water? (And how many men are able to swim for any distance or remain afloat for any length of time when heavily clothed?) Would an individual qualified according to our standards know when and how to conserve his energy when necessary? Would he know how to rest in the water? What would he do if he were to get a "cramp"? Would he understand the danger of chill and take the proper measures to avoid it? Would he be alert to the possible menace of a strong tide or current? Would he "keep his head" under trying circumstances? Would he know what to fear, and, most important of all, what not to fear, under the varied conditions he might encounter?

To repeat, the attributes of good watermen are possessed by expert swimmers. Inversely, expert watermen are always expert swimmers. Average swimmers are, however, usually poor watermen. All of which might be construed by some to mean that it is impracticable

to make adequate watermen of a majority of the personnel. We can not hope to make expert swimmers of everyone. We can not, therefore, make expert watermen of all, it is true. But we can certainly make adequate swimmers of most, and there is no good reason to suppose that we can not make their knowledge in the matter of watermanship balance their efficiency as mechanical swimmers. In addition to this, a more adequate knowledge of watermanship will increase mechanical swimming efficiency a hundredfold.

No inexperienced swimmer can possibly acquire the proper mental attitude necessary for competent watermanship until he is able to sift facts from the maze of misconception which has surrounded this subject in popular fancy. If he must wait until his experience is sufficient to do this for him he may never acquire the essential confidence. This often requires years of active association with the water, and the average individual who does not engage in swimming as a sport or recreation has no incentive for the acquirement of more than a rudimentary knowledge of these things. His information is usually limited to the popular fallacies which have become more or less standardized in the public mind. Misguided swimming instructors and uninformed newspapermen play no small part in the dissemination of much of this misinformation. The instructors are too frequently not qualified watermen themselves and can not, therefore, impart competent knowledge in this direction. They teach swimming and not watermanship. And, unfortunately, the acquirement of a little mechanical swimming ability without some understanding of the fundamentals of watermanship is often a dangerous acquisition. The newspapermen take up the matter where the swimming instructors usually leave off, and the information the average individual finally acquires in one manner or another is often a sadly disjointed hodgepodge.

One is accustomed to read in the news sheets of the drownings of expert swimmers under what appear to be rather ordinary circumstances. One is led to believe that it is not unusual for a thoroughly qualified swimmer to meet his death in placid, landlocked waters, often within easy reach of safety. Any skepticism which the uninitiated might have is usually appeased by the ready ingenuity of those who report these occasions. And when these things happen to experts, it is small wonder that the average individual despairs of ever attaining a proficiency in the water which will prove adequate to overcome the possibility of such sudden disaster. Those with any experience in these matters know that adequately qualified watermen do not fall into placid waters (or almost any sort of water, for that matter) and quickly disappear beneath the surface. They do not drown within easy reach of safety for any of the ordinarily inexplicable reasons usually advanced.

Many victims of drowning are known to have been possessed of a degree of mechanical swimming ability, sometimes above the average, it is true. But this fact does not mislead the experienced waterman as it usually appears to do those who report accidents of this nature. The latter often find themselves hard pressed to reconcile apparently conflicting facts. If the victim was an expert swimmer (and anyone who can swim well from a mechanical standpoint is an expert to the uninformed), something other than a lack of anything connected with the accomplishments associated with good swimming must have caused his death. He must have been beset by some vaguely understood menace which rendered all swimming accomplishments useless. Hence we have the "cramps," the "undertows," the "chills," the rather inexplicable "exhaustions," and any number of imaginary contingencies set forth in explanation of these disasters. The fact that there are accomplishments aside from mechanical swimming ability which practically assure one's safety under ordinary circumstances and the absence of which renders intimate association with the water hazardous is lost upon the average individual. The simplest, most plausible, and usually the actual explanation for most of these disasters, namely, poor watermanship, is overlooked altogether.

All this is not without its effect upon the beginner, and as a consequence he often approaches the task of acquiring swimming proficiency with much trepidation. His confidence is shaken before he enters the water the first time. He is not likely to recover from this state of mind unless he spends years in swimming activity. Then, and only then, he becomes one of the relatively few who realize what a tremendous hoax all this "water fright" really is. He is then in a position to understand that the gravest of all dangers encountered by the inept swimmer is misinformation.

An examination of the facts associated with a number of fatalities of the nature here referred to which have come to my attention during the past 15 years fails to disclose a single instance in which an adequately qualified waterman was drowned under circumstances in which an application of the fundamentals of watermanship could have saved him. In a number of cases I have been at the scene of accident within a few minutes to an hour or so following the occurrence and have observed the conditions as they existed at the time of the drowning. In others I have had the opportunity to obtain first-hand and reliable information as to the facts. In no case within my experience could the victim by any stretch of the imagination have been considered an adequately qualified swimmer or waterman. Some of them were unquestionably fairly good mechanical swimmers, and several, as seems to be the infallible rule in such cases, were reported to have been "experts." In practically all of

the cases I am satisfied that the individuals, in a sense, actually drowned themselves as a consequence of sudden obsessions with groundless fears. It is axiomatic among experienced swimmers that capable watermen do not drown as a result of "cramps," "undertows," or rapid "exhaustion." They may drown from chill and exhaustion, but only in the presence of other and more dangerous factors, and therefore not as a direct result of these considerations. An individual thrown into the sea miles from shore and without chance of early rescue can not be properly considered as drowning from exhaustion and chill, although he may indirectly do so.

Myths and misinformation have forced a preformed and erroneous conception into the mind of the inapt swimmer. The inexperienced sailor differs in no essential respect from the civilian in this regard. By teaching him to swim 50 yards we do not remove any of these misconceptions nor do we add much to his armamentarium. If he gains any considerable degree of confidence from this performance he is apt to be led into dangerous indiscretions as a result of an exaggerated idea as to the sufficiency of this single accomplishment. We actually invite misconception by designating such a man a "qualified" swimmer. If left to their own devices many individuals will continue to engage in aquatics and will eventually acquire all that is necessary in the way of experience in this respect. A great many will, however, not do so and will never progress much beyond the point where they become "qualified" swimmers according to our standards. It is neither fair to them nor to the Navy to permit them to stop short of adequacy in this direction.

I have not been speaking of swimming as a recreation, although there are few things which surpass it as a beneficial and interesting diversion, but I have limited myself to considering it from the standpoint of a useful accomplishment. In regard to those who spend years in close association with the water, it is not only a useful but a most necessary one. No Navy man can be fair to himself and avoid the acquisition of less than the important fundamentals of watermanship. The Navy in turn is not accepting its responsibilities if it permits him to do so.

There are many individuals who profess a disinclination for swimming. There are those who affect an attitude that their lack of swimming ability is rather a matter of principle with them than anything else. They do not like the water and they do not intend to if they can prevent it. All of which may sound logical enough to many, but it is far from this to my mind. One may logically refuse to learn to play golf without much injury to oneself. He can stay away from golf courses without difficulty.

One could only logically refuse to learn to swim, however, if one could be assured that one would never come into contact with the water.

But this is a difficult matter in our time. One would not refuse to learn to walk even if the opportunity to do so were within one's power. To a lesser degree it is just as illogical to refuse to learn to swim. In the Navy the acquirement of an adequate knowledge and capability in the matter of watermanship should not be left to individual preference. Many of the rabid antipathies one encounters with respect to the water are in the last analysis nothing but fear and timidity resulting from the popular distortion of facts. Anyone can attain adequacy in this respect. But there are many who have little confidence in their ability to do so. This confidence can be easily acquired under proper supervision, and a justifiable confidence founded upon a knowledge of facts and a true appreciation of one's capability is practically synonymous with good swimming.

Much emphasis has long been placed upon methods for the resuscitation of the apparently drowned in the naval service. The name of Schäfer is a byword to all. The fact that resuscitation has a prominent place in our first-aid instruction is a monument to our recognition of the need for a knowledge of resuscitative procedures. Then why not do a little something for the potential victim—for the man in the water? Why not institute procedures which will render the necessity for resuscitation more remote? The inconsistency in not doing so should be apparent to anyone. It would be more generally obvious if the knowledge of the fundamentals of watermanship was more widely disseminated.

The measures which should be adopted to bring the personnel to a proper state of fitness in this direction might be included under three general headings, viz, swimming instruction, instruction in watermanship, and a new standard of swimming qualification. First, the practical instruction of the beginner should be along lines which will give him a competent understanding of the fundamentals of watermanship as well as mechanical swimming; second, watermanship should have a place in the lecture instruction of all crews, just as first aid now does; third, the present swimming "qualification" should be radically altered.

SWIMMING INSTRUCTION

The plan of inaugurating the instruction of the beginner with a consideration of the orthodox swimming strokes should be abandoned. This practice is fundamentally wrong and is apt to prove disastrous to some of those so taught. When we observe the grotesque amount of effort utilized by one so instructed during his early performances in the water we need not wonder at his rapid exhaustion. When he begins to tire or for any other reason becomes uncertain of his capabilities he usually founders; and if he fails to make an attempted distance before exhaustion or panic supervenes

he often finds himself in desperate straits. Any casual observer who has witnessed the frantic stampedings of such a beginner must realize that something is wrong with the methods of swimming instruction which permit such occurrences.

The mental attitude of such a swimmer is decidedly unfavorable to his progress in the acquirement of proficiency in the water. He often completes these early swims with a seriousness of purpose little short of desperation. If he makes his goal, he feels that he has escaped calamity by seconds. If he has to be pulled from the water in order to save his life, no one will be able to convince him that death was not staring him in the face, and there is no reason why anyone should attempt to dissuade him from such a belief. Equipped only with the rudiments of some orthodox swimming stroke, he should never be permitted to enter the water. The old adage, "Sink or swim," is his golden rule.

Literally, there is not a more fallacious aphorism extant. But the swimmer's ignorance offers him little consolation in this respect. The fact that any swimming stroke is primarily a means of propulsion through the water rather than a requisite for remaining afloat is a hazy conception to him. He is perfectly well aware that there are some individuals who are qualified by nature because of light bony frames or generous amounts of fatty tissue to float. But he is by no means personally convinced that anyone, regardless of physical make-up, can remain at the surface with little or no effort.

What the beginner should know, and know first of all, is the fact that the water will support the body without any active swimming maneuver on his part. He can not sink until a sufficient amount of air in the lungs is displaced by water. The amount of effort required to maintain the body in a position affording comfortable breathing is no more than that required for walking. The swimmer may cease any propulsive effort and rest whenever he desires to do so. To dilate upon such an obvious fact may appear platitudinous to many. Yet, from the practical standpoint of the beginner, nothing is more sorely needed and more universally neglected than an adequate appreciation of the simple fact that one may rest comfortably in the water. It appears to make little difference whether the individual has a theoretical comprehension of this fact or not. The college professor is just about as inadequate at the onset in this respect as the plowhand. The individual should be dissuaded from the belief that any particular stroke is necessary for remaining afloat and at rest. He should, however, be thoroughly apprised of the fact that the body will remain supported at the surface only when entirely submerged or nearly so, and that the amount of effort required to remain at the surface is in direct proportion to the amount of the body weight exposed above it. A

drowning man frantically "paws" the water in an effort to "climb above the surface" and usually succeeds in driving himself under as a consequence. In the midst of these efforts he takes water into his lungs, sinks, and dies from asphyxiation. When the beginner gains a full appreciation of the danger of unrestrained activity in the water he has gone a long way toward insuring his safety. Most men drown in the throes of a frantic and misdirected stampede of effort.

A detailed account of the procedures which I believe to be best adapted to the preparation of the beginner for a proper acquirement of proficiency in watermanship would be out of place here, but a brief outline of the measures in mind might be of value in order to afford some general idea of the plan.

The initial instruction of the beginner should be conducted in a swimming pool containing a sufficient area of shallow water. The individual first acquires some estimation as to the buoyance of the water by repeatedly shoving himself away from the side of the pool with his body face down upon the surface and his head nearly submerged. He stands with his back against the wall in about 4 feet of water, and as he permits his body to fall forward gets his impetus with his legs while his feet rest against the side of the pool, just as one does when jumping into the air from the ground. After the initial shove he holds his arms and legs extended and rigid until his momentum is dissipated or until he becomes short of breath, when he again stands erect. This procedure helps to familiarize the beginner with the water, gives him some practical idea of the fact that it will support the body in a horizontal position as long as he has sufficient headway, and enables him to acquire the absolutely essential habit of keeping his face submerged. When he is able to perform this maneuver in a satisfactory manner he is given a demonstration of the buoyancy of the water from another angle.

The instructor enters the water at the deep end of the pool, takes a full breath, and permits his body to remain in a perpendicular position without any movement of the arms and legs whatsoever. The attention of the pupil is directed to the fact that the demonstrator's body is supported in this position when absolutely motionless, with the top of his head above the surface, for as long as he is able to hold his breath. A practical demonstration is then made of the trivial amount of effort needed to raise the face to a level where comfortable breathing is possible. When the head is thrown backward a slow and effortless movement of the hands and legs is sufficient to raise the nose above the surface and permit an indefinite maintenance of the body in this position in comfortable and almost complete relaxation. In the case of some individuals whose body frame is light or who possess a tendency to obesity the body tends

to assume a horizontal position in the course of this maneuver. This is often especially marked in salt water. But if the body naturally assumes the orthodox position of "floating" the phenomenon is incidental and not essential. Emphasis should be placed upon the fact that this is not primarily a demonstration of the accomplishment commonly known as "floating," a feat which only those who are naturally qualified are able to perform and in which the body is horizontal and not vertical, but that it is an accomplishment possible to anyone, regardless of how slender or obese the physical make-up. It should be pointed out that this demonstration clearly shows that anyone can rest comfortably in the water without "swimming." It should also be explained that "floating" is an accomplishment of much less value than that demonstrated, inasmuch as it can not be satisfactorily accomplished in rough water.

Now the beginner is asked to enter the water in the deep end of the pool, where he is of course permitted to support himself by holding to the side of the tank. A rope is passed beneath his shoulders and held by the instructor who stands at the edge of the pool. The beginner is then asked to take a deep breath and release his hold on the side. He is told to remain motionless until he desires to be pulled up, and this procedure is repeated until he is able to muster sufficient confidence properly to accomplish the feat. He next duplicates the performance of the instructor by maintaining his face in a position for proper breathing. Later he is permitted to perform the tests without the assistance of the rope, under careful supervision, of course, and by using the side of the pool for support when necessary. It is then made perfectly clear to him that he is able to remain at the surface without effort notwithstanding the fact that he does not know how to "swim."

After this he is taken once more to the shoal end where he repeats the first maneuver described. But this time he uses a short up-and-down thrashing kick which gives him a means of slow propulsion through the water for as long as he is able to hold his breath. The kick in addition serves to keep his legs near the surface and therefore maintains his body in a position parallel to it. By this time the beginner is personally convinced that the water will support the body with very little effort on his part and he does not associate the kicking movement with anything essential to remaining afloat. Emphasis is placed upon the fact that this procedure is solely for the purpose of maintaining the body in a horizontal position and for the slight propulsion afforded. And the beginner is now in a position to understand and believe this fact as a direct result of his own experience. The advantages of the horizontal position for ease of progress through the water over all others in which the body lies

at an angle to the surface are explained. The resistance to progress offered by the other positions is, of course, obvious.

When he has acquired a proficiency in these things, and not until then, the first attempt at any definite swimming stroke is made. A simple modification of the "crawl" is the easiest to acquire since it is the most natural. It is not far removed from the customary "dog paddle" first acquired by an unaided youngster when left to his own devices. The "crawl" and its modifications are also the best strokes for general use. The greatest distance can be covered with the least effort by a stroke on the order of the "trudgeon" which is similar in principle to the "crawl." The "straight crawl" is the most rapid method of propulsion for short distances. A good "crawl" stroke may be beyond the reach of the average individual, yet it is nevertheless advantageous to begin the instruction with such a stroke in view because of the value of the fundamental principles acquired as a result. It is always a simple matter to turn to one of the side strokes in the event the pupil does not progress readily in the original direction, and the experience acquired in the initial instruction is just as valuable, regardless of the strokes later used.

Up to the point where the rudiments of the "crawl" or "trudgeon" are mastered no attempt toward breathing instruction is made. Breathing is difficult in these strokes until the individual is able to develop sufficient momentum, as the head is partially submerged and the face is in the water most of the time. If one attempts to breathe at the onset, he will experience considerable difficulty, but after the stroke is sufficiently mastered it is easily performed. In the early instruction the individual is required to keep his face in the water and to hold his breath. The first attempts at swimming are necessarily of short duration as a consequence, but the habit of keeping the face and the head in the water is most essential and just as important to good watermanship as the swimming maneuvers themselves.

It will be seen that in the plan of instruction here outlined the actual swimming stroke has a less important place than in other methods where it is usually the sole consideration. From this it might be argued that the beginner will not learn to swim so rapidly as would otherwise be the case. If this were true it would in no wise negative the use of the method described, inasmuch as the value of the fundamental knowledge and confidence acquired in this manner far outweighs any plan of procedure where rapid swimming proficiency from a mechanical standpoint is the sole aim. But as a matter of fact swimming proficiency can be more rapidly acquired by this method than by any other. The point where the individual first actually begins to swim may be delayed, perhaps, but his attain-

ment of any proficiency in this respect is certainly hastened. There is no merit in being able to swim and not being able to rest in the water when necessary. The ability to do such a thing is not an accomplishment in any sense of the word. It is a very dangerous acquisition. Yet there are any number of well-intentioned individuals busily engaged in promoting such a faux pas. The progress of the individual under the plan here outlined, when once actual swimming is begun, is very much more rapid than would otherwise be the case. In addition he knows how to rest when he desires to do so. He does not have to be pulled from the water because of exhaustion, and he is not likely to become stampeded through any lack of confidence in his swimming abilities.

The time-honored custom of instructing beginners in the mechanical maneuvers of the various strokes on dry land before they even enter the water can not be too strongly condemned. Perfection in the mechanism of any stroke is an advantage to the advanced swimmer, but the beginner should be dissuaded from the generalized obsession that swimming strokes have all to do with remaining afloat. And this matter of remaining afloat is the foremost consideration in the mind of the inept swimmer. It should be the foremost and first consideration in the mind of the instructor as well. The old methods are utilized by those who teach mechanical swimming and not watermanship.

The habit of teaching the breast stroke to beginners should be abandoned, since no stroke is more difficult to acquire. It should form a part of every swimmer's repertoire since it is a most useful stroke for many purposes, but it had best be disregarded until the individual is fairly proficient in the others. It is unusual to discover anyone aside from an expert swimmer who is able to use this stroke as it is usually demonstrated. The leg motion is too awkward and cumbersome. For some reason unknown to me the "frog kick" which is usually taught in connection with what might be called the orthodox breast stroke has persisted through the years in spite of its inferiority to the more natural and more efficient "scissors kick." The orthodox breast stroke is evidently a valiant attempt to emulate the frog. The similarity in construction of the frog and the human bodies is probably the reason for the persistence of this rather antiquated fetish. But when one stops to consider the matter there is little basis for comparison between man and frog in respect to a swimming kick. The frog is webfooted and gets his momentum from the soles of his feet. The human gets such momentum as he is able to derive from his lower extremities by the purchase he attains from the inner sides of his legs. He can do this to much better advantage by the use of the "scissors kick." He can derive more

power from and offer less resistance to the water in this manner, whereas with the "frog kick" he is considerably handicapped in both of these considerations. The breast stroke with the "scissors' kick" is the one ordinarily used by most swimmers, since it is much more easily and naturally acquired. It is held by most instructors to be merely an unsuccessful attempt on the part of the individual to swim the orthodox stroke, which it usually is. But it is the better stroke of the two and should replace the latter.

The method of instruction here outlined requires considerably more care in its presentation than do other plans, but considerably more of value is imparted than is otherwise the case. To be successful it requires an intelligent appreciation of the objects in view on the part of the instructor and the competent supervision of a thoroughly experienced waterman.

"Swimming" is a purely relative term. It may mean much or little, and every experienced waterman knows that oftentimes a little mechanical ability in this direction is a dangerous thing. This is certainly the case with the individual who learns to swim mechanically without acquiring the necessary knowledge with which to protect his life in the water. A start in the wrong direction is worse than no start at all.

Watermanship is a definite acquisition, but, unfortunately, not a readily demonstrable one to the uninitiated. Just as a good mariner may have difficulty in impressing anyone with his capabilities as a sailor until an actual emergency arises and puts him to the test, so to a lesser degree with the waterman. The inexperienced may have some difficulty in estimating the ability of the latter with respect to a determination as to how he will conduct himself in an emergency. A good sailor is much more capable of estimating sailor-like qualities in another than is the landsman, and he is able to place a truer estimate on the values of the different methods and procedures considered essential for adequate preparation in his field of endeavor. The expert waterman in like manner is able more thoroughly to appreciate the importance of the various procedures best calculated to prepare one for an acquisition of the fundamentals of watermanship and better to judge the abilities of anyone in this respect than is the purely mechanical swimmer. For this reason any plan of instruction such as here outlined can be best appreciated by a qualified waterman. The lack of the ready demonstrability of the merits of a plan of instruction which aims primarily at preparing the individual for properly acquiring the fundamentals of watermanship is the chief reason for the failure of such measures to enjoy a more general adoption. Any method, however, which teaches nothing but mechanical swimming is an inferior plan for the instruction of beginners irrespective of how rapidly the indi-

vidual acquires a few mechanical swimming maneuvers. It is difficult to make the inexperienced realize that there is any distinction between "mechanical swimming" and "watermanship." Many individuals are never satisfied that such a distinction exists until an emergency arises which forcefully demonstrates their error. Unfortunately, many of these are not now alive to benefit by their discovery.

INSTRUCTION IN WATERMANSHIP

No attempt will be made here to present an outline of this instruction, but some of the more important subjects which should be embodied therein are touched upon in the paragraphs which follow.

Instruction in watermanship should be given to all inexperienced swimmers at frequent intervals in the same manner in which first aid is now presented. This instruction should be given by expert watermen only, for obvious reasons. The officer personnel of each ship's company usually contains one or more qualified watermen capable of presenting this subject in a proper manner. The purposes of this procedure would be to furnish authoritative information to the inexperienced members of the crew which will enable them to differentiate the actual from the imaginary dangers likely to be encountered in the water and to outline for them the proper mode of conduct to insure safety under varied circumstances.

"Cramps" should have adequate attention. No single consideration among all the real and imaginary menaces encountered by the swimmer has been more grossly misrepresented. Many deaths are indirectly due to this cause, without doubt. Fright, actuated by an erroneous supposition as to the sinister possibilities in such an occurrence, is, however, the direct cause of all drownings associated with this factor. To the experienced waterman a cramp is nothing more than an inconvenience. It may prove very uncomfortable or even painful at times, it is true, but I have no record of an authentic instance in which an experienced waterman has been dangerously incapacitated from this cause, and I know of no experienced swimmer who has.

We find cramps occurring most frequently in those who are accustomed to considerable muscular exertion in the water. They are habitually encountered by those who engage in swimming as a competitive sport and may occasion the withdrawal of some of these from further participation in a swimming race, particularly at the distances. They also occur in those who place strenuous demands upon untrained muscles while engaged in swimming. But from the standpoint of safety a cramp of this sort is not properly a consideration of much importance to anyone with adequate experience in the water. In the large majority of cases it confines itself to a single

group of muscles, and it may ordinarily be relieved by simply altering the stroke sufficiently to allow some relaxation in the muscles involved. Most frequently it is not necessary to stop swimming. When severe, however, the condition is more readily relieved by pausing in the water and actively rubbing the affected muscles while the involved limb is maintained in relaxation. At times an entire extremity or more may become affected, but this is uncommon. The trunk is rarely involved, although the abdominal group of muscles may become affected. I have no personal knowledge of any instance of a fatal abdominal cramp in an experienced waterman. This is considered a serious matter by some and has been so reported. I am inclined, however, to scout any such attitude, since I know of no well-founded reason why an involvement of this group of muscles can not be as readily relieved as any other. It has been stated that this condition is probably due to exertion in the water shortly after a full meal, and those who report it state that it has not been known to occur later than two hours after eating. While I believe that this condition can be readily relieved, and although, as a serious consideration, it is exceedingly uncommon, I, however, feel that it is a safe plan to avoid recreational swimming shortly after eating. I know of no case of serious involvement of the thoracic muscles.

The exact nature of these cramps is not understood, but there is no question but that they are intimately associated with exertion. Some individuals are more susceptible than others. Those of muscular build are more prone to affection than those of average development. The prolonged use of muscles not properly trained to swimming is practically certain to result in cramps. Chill is held by many to be a factor, but this is contrary to my experience. Muscular exertion in cold water is just as apt to result in cramps as it is in warm water, but I am convinced that the low temperature is not a factor.

An "undertow," as popularly conceived, is a myth. The swimmer may properly cross this factor from his list of actual menaces. Wherever any quantity of water is emptied into a river, bay, etc., as is often the case at those points where dams, canals, and the like overflow, or where outlet pipes from commercial sources, sewers, etc., exist, there is apt to be a strong subsurface current in the immediate area of the discharging water. Such areas are, of course, menaces to swimmers, but these places can be readily avoided by those who intend to swim for pleasure, as these dangers are obvious.

The apparent origin of the "undertow" of popular fancy is the inevitable backwash from the "breakers" encountered upon flat, shoal beaches. This may readily pull one off one's feet and force one beyond one's depth if one elects to stand upright in shallow

water when the "rollers" are sizable. This is no menace to an experienced swimmer, since he can immediately return to shore upon the tops of the same type of "rollers" which carry him out. An inexperienced swimmer may, however, get into serious difficulties in the breakers, and an unguarded ocean beach is the last place such an individual has any excuse to be. Anyone who has any reason to pause before the "beware of the undertow" signs which are frequently displayed about the various ocean beach resorts had best beware of the beach altogether until he is sufficiently informed as to the nature of this menace and is capable of combating it. If the various beach-resort officials were as frank about the matter as they are free in distributing these placards they would advise against ocean bathing for all inexperienced swimmers when any sizable surf is running. But since this would not be good for business, they find it cheaper to hire a trained staff of life guards to offset this unquestionable risk to the inept.

The "undertow" does not exist in open water. Notwithstanding the repeated reports of drownings in civil life due to the victims being pulled beneath the surface by mysterious underwater currents, the beginner should be given to understand that these reports are pure bunkum. I have personally investigated every locality within my reach for a number of years where strong undertows have been extensively advertised and I find no explanation other than that given above to account for these rumors. In several instances I have talked with the officials who caused the posting of placards announcing the existence of strong undertows and have found them unable to give any explanation for their signs other than that a number of drownings had occurred and were reputed to have been due to this cause.

Rough water is apt unduly to frighten an inexperienced swimmer. Generally speaking, no one should attempt rough-water swimming as a pastime until he is sure of himself. But, so far as one's ability to remain upon the surface is concerned, anyone who has no reason to fear a smooth surface has little cause to be worried about a rough one. It may appear sinister from the deck of a ship, but anyone with a fairly adequate experience can remain safely upon the surface in far rougher water than that upon which it is humanly possible to launch a lifeboat. It may be difficult or impossible to make any headway or to remain within a definite area in a sea in which the waves are being driven before the wind with any force. One should, however, have no qualms about remaining afloat if rescue is possible. All one's attention should be focused upon maintaining as good a position as possible with respect to the area of probable rescue. The only trick about this sort of swimming is in keeping the body sub-

merged as much as possible. The buoyancy of the water is the same, smooth or rough, and the danger of fatal submergence is not increased so long as the individual is able to breathe. The difficulty in this respect is increased in direct proportion to the irregularity of the surface and the amount of breaking water. So long as the waves are fairly regular, as is practically always the case in open water, it matters not how rough the surface becomes. Breathing is not difficult in the absence of a "chop." The side stroke with both arms in or one arm out of the water and the breast stroke are the best for this sort of swimming.

Conditions near a shore line may render swimming impossible. No one would be able to live through the irregular "chop" and breaking water often encountered in relatively shoal areas, particularly when the bottom is uneven and the beach irregular and rocky. No attempt should ever be made to swim toward a rocky beach through very rough water unless no alternative presents itself. Even if it were possible to survive the "chop," the chances of escaping death from being dashed against the rocks are often slim. If rescue is likely one should swim away from rather than toward such a beach and remain well outside the danger zone so long as there is a chance of being picked up or until the dangers of chill and exhaustion are imminent.

Currents and tides are real menaces and should always receive careful consideration. Those who swim for pleasure should acquaint themselves with the condition of tide and current wherever they enter the water. A strong tide may easily carry one beyond the limits of safety and prevent a return to the desired goal. Those who are accidentally thrown into the water should give immediate attention to their position in relation to the area in which they desire to remain while awaiting rescue. The force of a strong tide is often impossible to offset and one is frequently unable to remain in any definite area. Under such circumstances and unless one's whereabouts is visible to rescuers it is often best immediately to strike out for some attainable point of safety, if one exist, rather than expend one's efforts in the frequently futile attempt to offset a tide. One should never strike out blindly for the nearest point of safety when tidal conditions are more favorable in the direction of another attainable though more distant goal. To do so may easily result in failure to reach safety at all. Poor judgment in this respect has undoubtedly cost the lives of many good mechanical swimmers. The easiest distance to negotiate is by no means invariably the shortest, and the effect of tidal influences in the absence of close fixed points is by no means a simple matter to determine under all conditions. When a strong wind is blowing one may at times make good progress against a strong tide by taking advantage of the

impetus afforded by the waves, a thing any qualified swimmer can soon learn to do. An intelligent consideration of the particular conditions of the moment will often save one's life when the strongest mechanical stroke if blindly used may prove inadequate to the occasion. Brawn is by no means synonymous with safety in the water.

Chill is one of the chief dangers encountered by the swimmer. In many naval disasters it is without question the gravest menace. When one is compelled to await possible rescue under circumstances which render swimming futile the avoidance of chill should have first consideration. Even when the temperature of the water is apparently comfortable, as it often is following prolonged exposure, every effort should be made to keep the blood circulating rapidly. A temperature which is only relatively low will prove fatal before ordinary effort exhausts one, and a proper relation between the possibility of such a contingency and the conservation of energy should be carefully maintained.

Exhaustion should of course be carefully guarded against and one's energy should never be expended in excess of the demands of the occasion.

When one falls or is suddenly thrown into the water and there is a possibility that rescue will not be immediate, or if any swimming must be done, the first consideration should be given to the removal of excess clothing. This is ordinarily not a difficult procedure to the experienced swimmer, but some difficulty may be encountered in removing one's shoes. The lace knots may become "locked," and, if they are of cowhide or other strong unbreakable material, the situation may well prove very unfortunate. It might be a worth-while precaution for all Navy men to assure themselves that their shoe laces are habitually tied in simple bows and are of breakable material.

A life preserver is a definite menace to any capable waterman. It offers him nothing in the way of safety and is a great hindrance to his activities in the water. It is intended to maintain one upon the surface, and I have endeavored to show that this factor is really an unimportant consideration to anyone who has been properly instructed in watermanship. Some effort is nearly always needed to prevent chill, and this is usually in considerable excess of that required to remain comfortably afloat. A life preserver is a necessity for one fully clothed if he is going to remain so. But if any swimming is required (and there are few occasions where it is not) clothes are a menace to safety, as has been stated.

Swimming is often just as important a consideration in getting away from an immediate zone of danger as it is in getting rapidly

to a point of vantage; and no one can take good advantage of his swimming capabilities with a life preserver on. A good swimmer with such a contraption strapped about his chest is about as helpless in the water as a man in a deep-sea diving suit would be on land. For those who are not qualified watermen a life preserver is an absolute necessity, of course. But it is a very poor makeshift as compared with an adequate capability in the matter of watermanship. An adequately qualified waterman can remain safely afloat as long as he can remain alive, and without the life preserver he is in a position to take advantage of every possible opportunity to save his life. It would certainly not be an easy matter to rid one's self of a life preserver as I have frequently seen it put on. The knots are usually tied to remain fast, and when once wet with water I think most of them would. The use of the life preserver should certainly be optional, and no one should be compelled to wear one if he be qualified to care for himself in the water.

It is of the utmost importance that all swimmers understand the danger of becoming confused or frightened in the water. The more dangerous the situation the greater the necessity for clear thinking and good judgment. One should train oneself to disregard all imaginary menaces and concentrate one's efforts upon the actual dangers, of which there are relatively few. A good waterman never permits himself voluntarily to get into situations which may embarrass his capabilities. He takes no foolish nor unnecessary risks. The crews of guard boats, running boats, etc., should be carefully selected. Only thoroughly qualified watermen should be assigned to this duty, not only for the sake of the safety of the boatman himself but also with a view to the possible assistance which he may afford a passenger when necessary and because of the discriminating supervision which he could exercise as to the conduct of the passenger when boarding or leaving the small boat or when riding therein.

When in pursuit of recreation the inept swimmer is inclined to do many foolhardy things. Even nonswimmers will repeatedly fare forth on canoeing expeditions with no consideration whatsoever as to what they will do if their craft overturn. Such sport is safe enough for a swimmer who knows what he is about, but the misplaced enthusiasm of a multitude of inept watermen for this and similar pursuits is absurd, or would be if it were not so pathetic.

Generally speaking, diving is a form of recreation not to be encouraged. Middle-ear infections and ruptured drums are commonly encountered in those who indulge in this form of diversion. High diving is apt to cause back strains or more serious injury and is an accomplishment of little practical value. All swimmers should learn to dive well enough to be able to enter the water in this manner. High diving should, however, be discouraged.

ADEQUATE SWIMMING QUALIFICATION

An outline of a swimming qualification, which it is believed would give us some assurance as to the individual's ability to guard his life in the water, follows:

1. The candidate should be required to swim a definite distance, using any one of the following strokes: Side stroke with both arms in the water; side stroke with one arm out of the water; trudgeon; crawl. The idea of this test would be to determine the individual's competence to negotiate a creditable distance in an acceptable manner. He should not be credited with this accomplishment until he has demonstrated that he has fairly mastered one of the above strokes by his manner of swimming. He should not only be able to swim the particular distance but should be able to do so without an unnecessary expenditure of effort and without pausing to rest. The distance for this test should be at least 100 yards.

2. Next he should be required to swim a short distance within a definite time. We might say, for example, that he should negotiate 25 yards in 30 seconds. Any one of the strokes mentioned in the above paragraph could be used for this test. The idea of this requirement would be to determine the individual's ability to move rapidly through the water for short distances. This is an important consideration, as before mentioned, since it is often necessary to get rapidly out of the radius of possible danger, and it is of advantage in that it permits one to gain a point of vantage in an emergency which might otherwise be lost.

3. The candidate should then be required to remain within a restricted area of water for a given length of time, using as little effort as possible and no definite swimming stroke. This could be accomplished, for example, by having him remain within several yards of the side of a lifeboat and between points opposite the bow and stern of the same for, say, two minutes. This test would, obviously, assure us of the swimmer's ability to rest in the water.

4. Next, he should be required to swim for about 25 yards when fully clothed. The importance of this test is obvious.

5. He should then be asked to remove his shoes and outer clothing while in the water. This accomplishment is of self-evident value.

6. He should then be required to swim 25 yards with the breast stroke (unorthodox), with his head above the surface, to determine his ability properly to get his bearings in the water.

7. If he has not already done so in one of the tests above mentioned he should demonstrate his ability to swim 50 or 100 yards with a stroke in which his head is in the water. This is for the purpose of determining his ability to use a rough-water stroke.

8. I would mention one other qualification about the practicability of which I am not certain. There can be no question, however, as to its desirability. This would have to do with a more exacting and more advanced qualification for boat crews. It seems to me proper that men assigned regularly to this duty should be able to pass at least a simplified life-saving test. That used by the Red Cross would form a good basis for this qualification if the entire test were found impracticable. Personally I see no reason why men performing this duty should not be qualified in life-saving. The idea here would not be that solely of a perfection in the art of saving lives but rather to give to these men, through an intimate contact with the water, a greater self-reliance when performing duty thereon. It is impossible for me to reconcile any expectation of expert small boating with inadequate competence in the matter of watermanship and all its branches.

CONCLUSION

The measures which I believe best adapted more adequately to insure us against such a great and, I am convinced, in large degree unnecessary, loss of life from accidents of the sort referred to, have already been largely outlined. These measures are simple, practical, and easily instituted. The expenditure of funds in this connection would be trivial and the additional effort would be small and well compensated. There is nothing experimental about the matter here presented, and the only new departure to be encountered in the adoption of such a plan would be a consideration of the practicability of its presentation to an organization of the size and nature of the Navy. A plan of this sort requires intelligent supervision and careful handling to be successful, as does any consideration in which human nature is to a large extent the controlling factor. It most of all requires the enthusiastic support and a thorough appreciation of the objects in view on the part of the instructors. But in this respect it differs in no way from any other plan of instruction for swimmers, excepting in the difference in its method of approach and its greater comprehensiveness. I believe there is no organization so eminently fitted to prosecute successfully such a plan of instruction, and certainly none more urgently in need of the benefits contemplated in this discussion, than is the Navy.

I am convinced that if measures similar to those here suggested were put into practice and properly conducted considerable benefit would accrue to the personnel in addition to the purely protective features. Such instruction could be made an interesting high light in the normal routine and a greater number of men would unquestionably be attracted to the recreational advantages of swimming,

with consequent enhancement of their physical well-being and general morale. The enormous increase in the popularity of swimming as a competitive sport and recreation could find reflection in the Navy to our advantage, and the encouragement of competitive swimming contests between ships and stations would be a useful and beneficial move. Life-saving instruction and contests could be advantageously instituted for the pleasure and profit of the advanced swimmer, patterned preferably after the plans and procedures of the American Red Cross and now being successfully introduced by them.

The preparation and distribution of a booklet or pamphlet outlining the plan and purpose of the instruction contemplated and to serve as a guide for those charged with the presentation of this subject to the personnel would be an essential part of the measures here suggested and would be essential to its success.

There is of course no necessity for any accentuation of the importance of the subject of drowning, yet a glance at the Annual Report of the Surgeon General, United States Navy, for 1925, is illuminating. The summarization of the hazards connected with drowning for the year 1924 contained in this report is reproduced herewith.

Navy and military hazards (48):

Aeronautic hazards (10)—

Seaplane crashes.....	9
Fall with parachute.....	1

Other naval and military agents and hazards (2)—

* Target towing and repair party, swept overboard by line.....	1
* Fording river on horseback.....	1

Special naval hazards (35)—

Handling small boats (12)—

* Falls from motor boats.....	2
* Swamped in surf.....	1
* Capsizing of canoes.....	7
* Capsizing of wherry.....	1
* Fall from sampan.....	1

Falls overboard from naval vessels (16)—

* From gunport while cleaning gun.....	1
* From ship's deck while scouring punt.....	1
* From taffrail while emptying garbage.....	1
* From deck while working on life line.....	1
* From ridge rope of boat davit.....	1
* From gangplank between ships.....	3
* From deck of destroyer while wrestling.....	2

Accidental falls from naval vessels, exact circumstances unknown.....	6
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Storms and heavy weather at sea (7)—

Wave-swept grounded ship.....	4
Swept overboard during storm.....	3

Deep-sea diving (1)—

Diver improperly dressed (loose helmet).....	1
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Industrial and miscellaneous hazards (29):

Falls of persons (2)—	
Falls overboard other than from ships—	
* Fall from sea wall.....	1
* Fall from dock.....	1
Machinery hazards (5)—	
Gasoline explosions, motor-boat engine—	
Jumped overboard.....	5
Miscellaneous hazards (20)—	
* Skylarking.....	1
Swimming (within command)—	
Instruction in swimming.....	0
Swimming call.....	0
* Swimming parties at beaches, etc.....	7
* Fall from dock, ledge, shallow water, etc., into deep water....	2
* Swimming in deep water other than alongside ship.....	1
Swimming while on leave or liberty—	
* At beaches.....	2
* Swimming hole.....	1
* In river.....	1
* Attempted to desert by swimming from Parris Island, S. C....	1
* Drowned while duck shooting.....	1
Bodies recovered, cause of drowning unknown.....	3
Motor vehicles (2)—	
Closed automobile driven off bridge.....	2
Suicidal drownings (2):	
Jumped overboard.....	2

It is immediately apparent from the above table that many of the drownings there reported were unavoidable in so far as any consideration of watermanship is concerned. It is equally apparent that a large number of them must have been due in large measure to an absence of good watermanship. While it is impossible to draw any definite conclusions in this regard, since the information which any experienced waterman would need to place any exactness on a surmise in this direction is lacking, there is nothing fanciful about the occurrence of a large number of such cases. The death certificates in cases of this sort rarely contain those facts which would interest a waterman in a determination of the presence or absence of the factor of watermanship aside from the fatalities which were obviously unavoidable because of the presence of extraneous considerations. So nothing but guesswork can be utilized in forming any opinion as to the probable extent of the factor here referred to in connection with the above table.

An asterisk has been placed before those drownings in which I believe the individuals may have lacked the ability to care for themselves adequately in the water, in order to give some idea as to what I conceive to be the importance of this consideration. The chief items which would have to qualify such a surmise are injury and intoxication.

The victims of some of the drownings above selected were probably injured as a result of the accidents which caused their deaths and rendered incapable of utilizing such capabilities as they may have possessed in regard to caring for themselves in the water. In several of those deaths which occurred on leave and liberty as typified by those drownings resulting from falls from seawalls, docks, sampans, etc., intoxication may have played some part. In some of those drownings due to falls from naval vessels while under way there is a possibility that rescue was not attempted. However, as the circumstances in these cases are stated, it is probable that these accidents were observed or quickly discovered and rescue must have been attempted in nearly all instances. In view of these considerations, I have allowed a very considerable amount of leeway by not including a number of deaths in this "avoidable" grouping which probably belong there. Those which have been erroneously included are therefore probably more than balanced by those which have been arbitrarily ruled out. The asterisk has been placed before 43 deaths, and I feel that 50 per cent of the above cases is a fair estimate of those in large measure due to poor watermanship. My experience would lead me to believe that in civil life the deaths occasioned by poor watermanship greatly exceed 50 per cent of the total occasioned by drowning.

FLIES AND THEIR ERADICATION*

By E. C. CARR, Lieutenant Commander, Medical Corps, United States Navy

Flies are zoologically classified as insects, belonging to the class Hexapoda (Greek, ἕξ six and πούς foot), and the order Diptera (Greek, διπτερος two-winged); therefore, all animals with six legs are insects. However, all Hexapoda are not flies, for the insects are classified under four orders—i. e. (1) the order Rhynchota (to which the bedbug belongs), (2) the order Siphunculata (of which the lice are members), (3) the order Siphonaptera (in which order fleas are classified), and (4) the order Diptera, consisting of certain families, genera, and species. It is of this order that this paper treats. We shall speak briefly of several of the common species found in the temperate climate, for, as may be realized from the recent gift to the National Museum by Dr. J. M. Aldrich (1) of his private collection of Diptera, which contained 44,610 specimens, and 4,145 species fully named, in so short an article as this it would be impracticable to do more. There are 43,000 species known to science,

* This article was written at the request of a former commanding officer of the naval hospital, Great Lakes, Ill., under whose command the methods of fly eradication were instituted and successfully carried out by the author.

and it is estimated that the species unknown would bring the total to 350,000.

Certain insects classified as flies—(1) gallflies (superfamily Cynipoidea), (2) chalcis flies (superfamily Chalcidoidea), (3) ichneumon flies (superfamily Ichneumonoidea), and (4) sawflies (superfamily Tenthredinoidea)—are not true flies but belong to the order Hymenoptera, which, economically considered as a whole, is a beneficial group in its relation to man. Aside from the production of honey by the honeybee, there are a number of this order, thousands of the parasitic forms of which destroy noxious insects. Many of the forms are of utmost importance in the cross fertilization of trees and plants and certain galls have a great commercial value. This article, however, will be devoted to the discussion of common flies. "Entomologists are in accord in placing them at the head of the insect system in the point of evolution—that is, they are the most highly specialized of insects. They do not possess the apparent degree of intelligence of the bees, wasps, and ants; nevertheless, the completeness of their transformation and the highly specialized organization of the adults of several families supports this view." (2).

THE FAMILY SARCOPHAGIDÆ—FLESH OR BLOW FLIES

This family comprises many species, which derive their names from the fact that many of them live in the larval state in the bodies of dead animals, although the group as a whole is variable in habit. The females may deposit eggs in large numbers, or living larvæ, the eggs being hatched before they leave the body of the female. The screw-worm fly (*Chrysomya macellaria*) belongs to this group. In Texas and adjoining States it does its greatest damage to domestic animals. It lays its eggs in any skin abrasion, such as a barbed-wire cut or thorn puncture. The larvæ live in the flesh and thus produce a large ulcer. However, this fly does not confine its activities to domestic animals, for often it lays its eggs in the nostrils of man, especially in those suffering from severe catarrhal disease. The larvæ hatch and work their way through the upper nasal passages and sinuses, causing great tissue destruction, even to complete destruction of the soft palate. Fatal cases in man are not rare. The three members of this group which were found most abundant in the Great Lakes district were, viz:

- (1) *Calliphora erythrocephala* (large bluebottle fly).
- (2) *Phormia terrænovæ* (small bluebottle fly).
- (3) *Lucilia cæsar* (greenbottle fly).
- (4) *Sarcophaga sarracenix* (graybottle fly).
- (5) *Chrysomya macellaria* (screw-worm fly).

The common names of the first four species are derived from the body colorings. The bluebottle and greenbottle flies have black spines on their thorax, while the thorax of the graybottle fly is characterized by five comparatively wide longitudinal stripes.

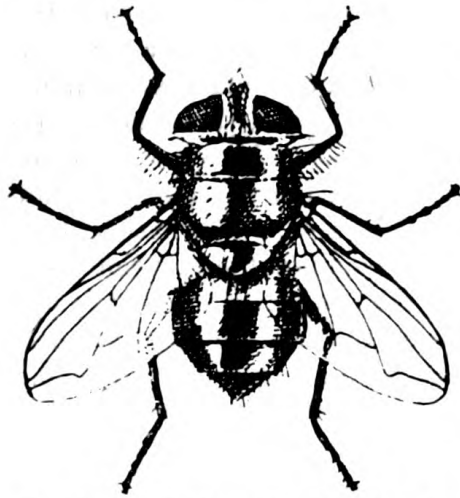


FIG. 1.—Small bluebottle fly (*Phormia terranovæ*). (From L. O. Howard)

The screw-worm fly, like the bluebottle fly, has a blue, metal-colored abdomen, but lacks the black thoracic spines of the latter. The noise which is characteristic of the bluebottle fly is made with its rapidly moving wings. Scientists, by tuning-fork comparisons, have estimated that they vibrate 300 times a second. The bluebottle fly, however, is one of those few insects that can make a noise other than with its wings. In forcing air in and out of the slits in its sides, through which it breathes, regardless of the fact that it has

no lungs, it can produce the well-known drone. The bluebottle fly is the scavenger, the buzzard of the insect world. Its larvæ live in meat, ingest it, and cause it to decay. Most flies, in fact, are scavengers. They and their young eat unclean objects and thus in a way do a certain amount of good to pay for the misery they produce in carrying disease.

The *Musca domestica* (fig. 2) is dull gray in color, with four longitudinal black lines on the back of the thorax. The fourth longitudinal

vein, near the wing tip, is distinctly elbowed. There is a marked absence of bristles on the abdomen except at the end. The two compound eyes, composed of 4,000 separate lenses, each set at a different angle, are close together in the male and farther apart in the female, and between them, superiorly, are three simple eyes; thus a fly is able to see in all directions. Below and in front are two antennæ, each with a feathery bristle. The mouth parts, which are

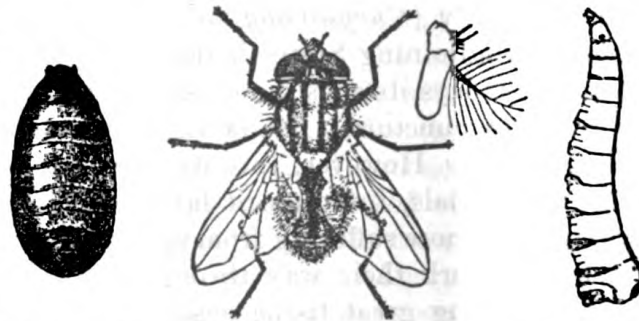


FIG. 2.—Common house fly (*Musca domestica*). Puparium, adult, antenna, and larva. (From L. O. Howard)

curiously jointed appendages, are slightly farther down and are equipped with a pair of feelers. At the tip the mouth parts expand into two lobe-like bodies covered with transverse ridges between which is the oral orifice. Liquids can readily be ingested, but in the ingestion of soluble solids the process is more difficult. The lobe-like bodies are applied closely to the solid surface; saliva is ejected upon it, and with friction of the hard transverse ridges of the lobes, produced by a sucking movement, some of the solid is sufficiently dissolved to be ingested. The process of ingestion is accomplished by abdominal contraction and expansion which produces a negative pressure within the stomach and thus the dissolved substance is sucked up.

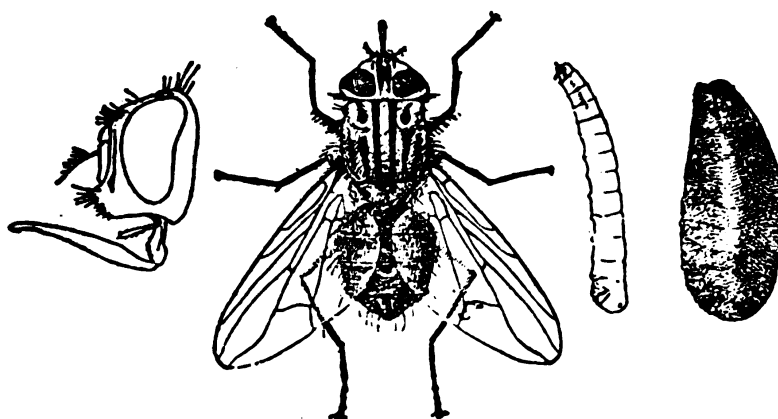


FIG. 3.—Biting stable fly (*Stomoxys calcitrans*). Ault, larva, puparium, and details. (From L. O. Howard)

It may often be heard said that the house fly bites, especially just before a rain. This, however, is a physical impossibility for the house fly, and is due to confusing this fly (*Musca domestica*) with the ferocious biting stable fly (*Stomoxys calcitrans*) (fig. 3). The house fly can not bite, for, as has been described, its mouth parts are developed as suckers and not as piercing organs.

One each of the six feet are two pads similar to the fleshy part of the human hand, and also two claws. Hairs cover the pads, and at the base of each hair is a sabaceous gland which excretes a glue-like substance which assists the fly to adhere to smooth surfaces, while to rough surfaces it clings principally by means of its claws.

The house fly lays about 120 eggs at one time, in small irregular clusters, preferably in moist, fermenting horse manure; but in the absence of this substance it will oviposit and breed in any decaying vegetable matter. The eggs are oval, elongated, and glistening white and under favorable conditions will hatch in eight or ten hours.

The white conical larva (maggot) sheds its skin twice, and in four or five days, under favorable conditions, reaches full growth. At this stage it burrows just beneath the surface of the earth. The outer skin hardens, turns brown, and the true pupa stage is now attained. It exists in this stage for five days and then issues from the anterior end of the pupal covering, a full-grown adult fly.

The house fly does not grow in size after exit from the pupal stage. Opinion to the contrary is due to the confusing of it with members of the family Anthonomyiidae, particularly the species *Homalomyia brevis* (little house fly, or *Fannia brevis*) (fig. 4).

Flies do not as a rule hibernate through the winter months. It is only an occasional individual that hides away in a snug retreat and thus lives through the winter. It is doubtful if adults under such conditions ever lay eggs. Entomologists generally concede that in

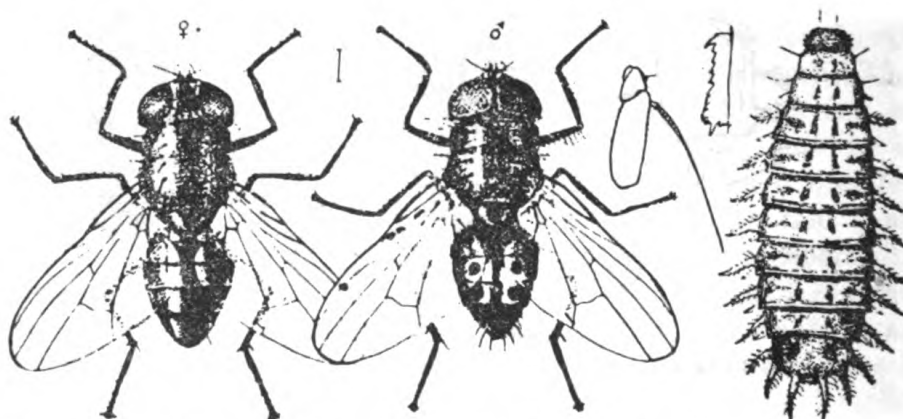


FIG. 4.—*Fannia brevis*: Female, male, antenna, and puparium. (From L. O. Howard)

the northern part of the United States the winter months are passed in the larval and pupal stages.

Realizing that the individual female house fly lays 120 eggs, and that the cycle from egg to adult, under favorable conditions in summer is only 10 days, the enormous numbers in which these insects may occur may be readily understood. It is theoretically estimated that one female April fly will be the grandmother of six trillion September flies. Thus the advantage is shown of pursuing a rigid fly-killing campaign early in the spring.

The *Muscina stabulans* (large house fly) (fig. 5) is often mistaken for the common house fly; but it is larger and does not have the dark lines running longitudinally on the thorax, nor the elbowed veins near the apex of the wings.

The name "stabulans" is a misnomer, as its larvæ feed upon human excreta and rotten vegetables as well as dung, and it is not particularly prevalent about stables, as the name would indicate.

The *Stomoxys calcitrans* (biting stable fly) (fig. 3) is the true stable fly, and is easily recognized by its bloodsucking proboscis; otherwise it markedly resembles the common house fly in size, shape, and colorings. Like the house fly, there are longitudinal stripes on the thorax, two only being complete, the others broken. There are spots on the abdomen. The female lays her eggs in rotten straw, hay, manure, or sawdust. It has been credited with the transmission of poliomyelitis (3), pellagra (4), and surra (5). However, its implication in the transmission of poliomyelitis and pellagra has been discredited (5).

The *Hæmatobia serrate* (horn fly) is smaller and darker than the house fly and particularly prevalent around cattle. They are blood-suckers, like the *Stomoxys calcitrans*, but bite by night as well as by day. They often cluster in masses about the horns. They prefer to lay their eggs in fresh cow dung. They are thought to have

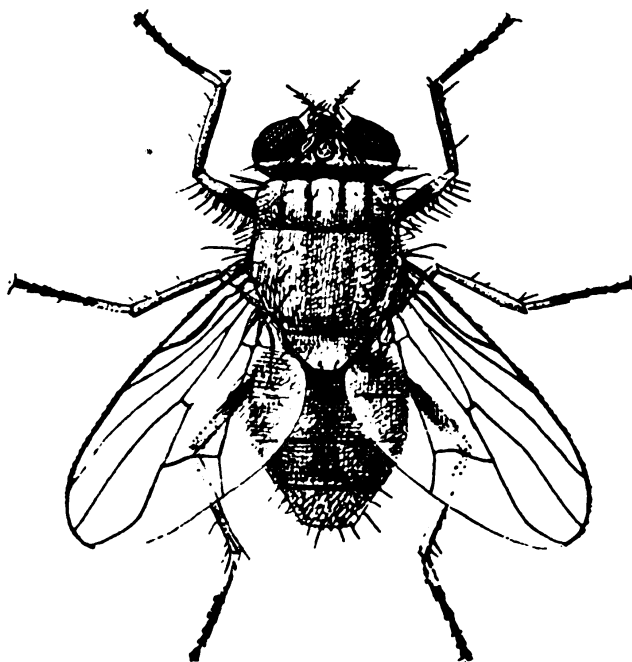


FIG. 5.—Large house fly (*Muscina stabulans*). (From L. O. Howard)

been imported from Europe in 1886, and since have become one of the most serious pests of cattle over the entire continent.

The *Pollenia rudis* (cluster fly) is slightly larger than the house fly, has a smooth abdomen, and is sparsely covered with light-colored hairs. It is a sluggish fly. Clusters are particularly abundant in the autumn.

From this short description of the most common species of Diptera found in the Great Lakes district it may readily be seen that in a campaign directed toward their eradication efforts must be concentrated along two lines, viz, (1) prevention of breeding and (2) destruction of the adult fly. An outlined method of eradication directed against the order will be discussed, with occasional mention of measures directed against particular species.

Interest must be stimulated in the antily campaign, and this is largely accomplished by news items, cartoons, stories, songs, etc., placed in the station bulletin.

A working outline of the campaign is as follows:

- I. Prevention of fly breeding.
 - A. Efficient waste disposal.
 1. Garbage.
 - (a) Garbage houses.
 - (b) Garbage containers.
 - (c) Garbage collecting.
 - (d) Garbage disposal.
 2. Rubbish.
 - B. Care of barns, pens, and dovecotes.
 1. Screening.
 2. Manure.
 3. Spraying.
 - C. Care of streets.
 - D. Care of ravines.
 - E. Miscellaneous.
- II. Destruction of the adult fly.
 - A. Swatting.
 - B. Trapping.
 - C. Use of chemicals.

Garbage houses.—They should be of open construction, with concrete decks. The deck should be drained and the drain connected to the sanitary sewer, with sanitary trap in drainage line. The foundation should be an integral part of the deck and have an elevation of 6 inches to a foot above same (fig. 6). Garbage houses should be operated under the following rules:

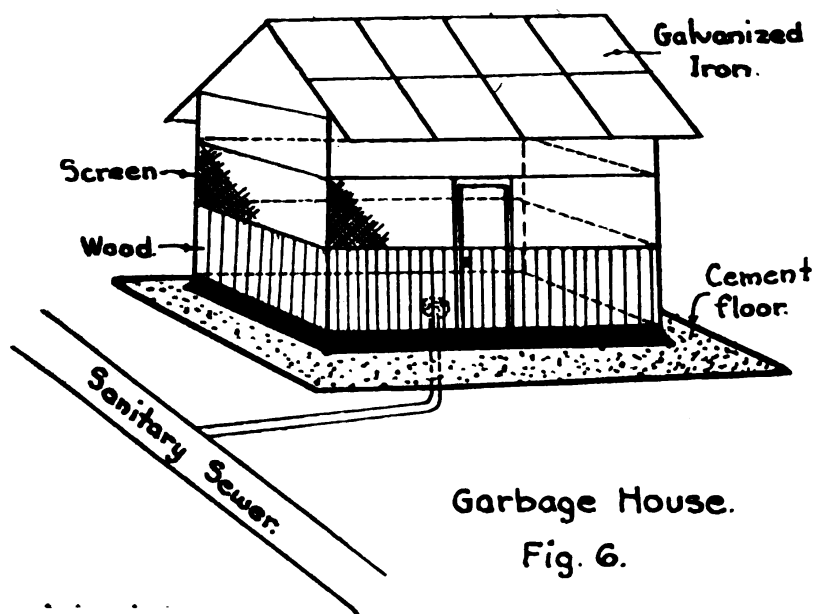
1. The transfer of garbage from one can to another should not be permitted.
2. Cans should be kept covered at all times.
3. Filled cans should be removed from garbage house to crematory at least once daily.
4. Immediately upon removal of filled cans, house should be flushed out with running water and sprayed with fly-repellent solution.
5. Door to garbage house should be kept closed at all times except when filling, removing, or replacing cans.

The garbage containers should be of corrugated galvanized iron and supplied with covers. The original garbage containers should be used in transferring the garbage from the garbage house to the disposal plant.

The only satisfactory way to dispose of garbage and other combustible refuse is by fire, which process may be accomplished by the use of the most simple method, the "rock-pile crematory," or by the grate crematory. The latter are of various kinds. They should be

capable of cremating at least 2 tons per hour, and so constructed as to consume all waste, manure, rubbish, tin cans, etc., as well as garbage. It is particularly desirable that empty tin cans be cremated, as they always contain organic matter adhering to their walls, and thus afford favorable media for fly breeding. Figures 7 and 8 illustrate an excellent type of disposal plant. The building should be of reinforced concrete construction with concrete decks. An excellent type of crematory grate is described by Valery Havard, M. D., in his *Manual of Military Hygiene*, pages 595 and 596.

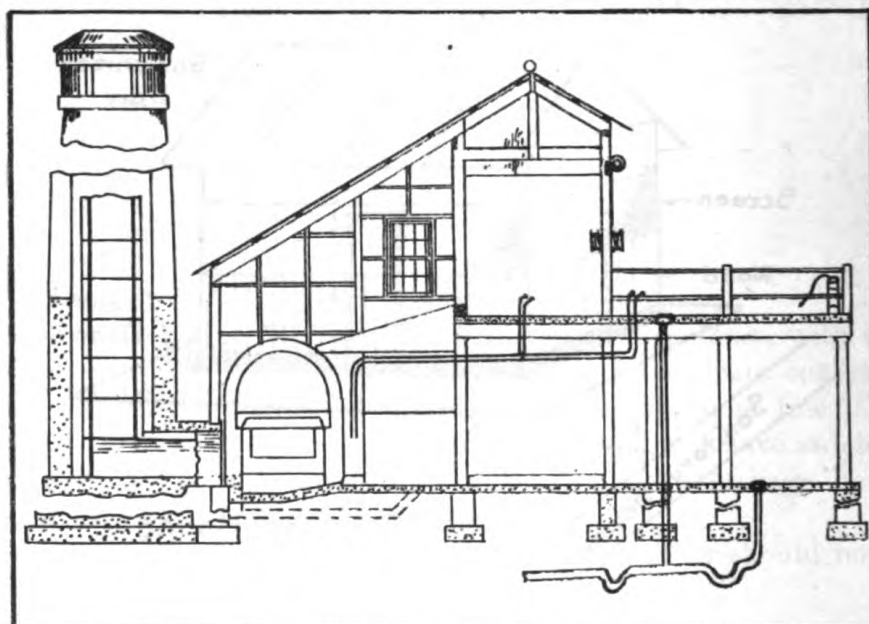
At the incinerator building the full cans should be exchanged for empty cans, which on the previous day had been washed in lye water, sterilized, and dipped in a plaster of Paris-lime-whitewash solution



(fig. 8). After the truck is emptied of full cans it should be washed out with running hot water before leaving the truck platform and sprayed with fly larvicide and repellent solution (later described). The water is heated by the incineration of the garbage. The hose reels and connections are shown in Figure 8. Garbage-truck platform and dumping platform should be washed down with hot water and sprayed with fly-repellent solution after each day's garbage haul has been completed. This occupies but a very few minutes when the procedure is provided for as illustrated in Figure 8. After the truck is properly cleaned and sprayed, clean whitewashed cans are placed therein and returned to the garbage houses.

Rubbish dumps are a great source of fly breeding and should be eliminated as far as possible. All rubbish that is combustible should be burned in the incinerator. Where rubbish dumps are of long

standing and unable to be removed they should be treated by liming or cinder surfacing and once weekly treated with fly larvicide repellent solution. This solution consists of 3 per cent bone oil in coal-tar creosote oil containing at least 14 per cent tar acids and 3 per cent bases. This solution was evolved by Drs. F. W. Foreman and G. S. Graham-Smith, of the Royal Army Medical Corps, after the most exhaustive experimentations on fly larvicides and repellents. Bone oil (a nondrying oil) is added to the coal-tar creosote oil to increase the latter's efficiency in wet weather, the coal-tar creosote oil being the active constituent and obtainable from any of our large oil companies.



End Elevation
Crematory Bldg.

Fig. 7.

Care of barns, pens, and dovecotes.—In the care of these, particular attention must be paid to screening of all openings and to the proper disposal of manure. The interior of the barn and cages should be whitewashed and frequent spraying of stalls and cages with the fly-repellent larvicide solution should be carried out. Manure should be burned as the best method of disposal; but where it is desired to use it as fertilizer, it may be kept in manure boxes made as fly-proof as possible and provided with a fly-trap on the top to catch the flies that breed out (6). Manure may be hauled out and scattered on the fields in a thin layer. Thus dried out, it is no longer a source for fly breeding. Manure pits properly screened and

provided with flytraps are adaptable under conditions where other methods of disposal can not be carried out. Manure racks provided with maggot traps (7) is a method of manure disposal that is not recommended, for without constant care of the water trap this method does not absolutely eliminate breeding.

Prof. C. F. Hodge (8), of the University of Oregon, recommends mixing the manure with 0.62 pounds of borax per 8 bushels, or to 10 cubic feet. This works better if the borax is in solution or if the manure is wet down after the powder has been evenly dusted over the pile. Professor Hodge says that the borax thus used "kills 90 per cent of maggots, and if used on land at the rate of not more than 15 tons per acre, it is not injurious to crops."

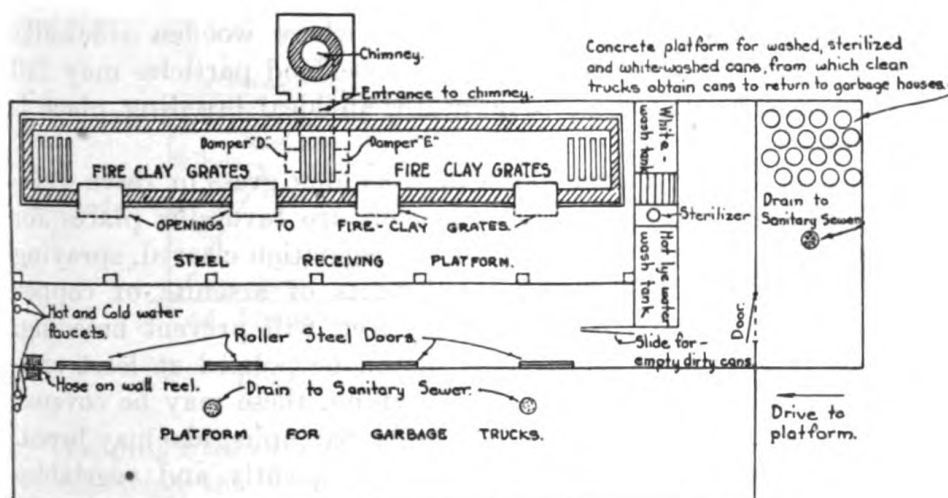


Fig. 8.

Manure may be treated with the coal-tar creosote solution, 1 gallon to the ton, or 100 cubic centimeters per horse per day. The manure does not seem to be impaired in its usefulness as a fertilizer by this treatment.

During the campaign at Great Lakes the horse barn nuisance was cared for under the following rules:

1. Manure was cleaned from stalls daily.
2. Manure was put in air-tight garbage cans and delivered to incinerator daily, clean empty whitewashed containers obtained in exchange.
3. Stalls were flushed out daily.
4. Stalls sprayed twice weekly with fly-repellent solution.
5. All outside openings were kept screened.
6. Sticky paper pendants were kept suspended from overhead.

The dog kennels and dovescotes were operated under the following rules:

1. Every second week the inside of kennels, bed boxes, platforms, and dovescotes were whitewashed.
2. Once weekly decks were swept and sweepings cremated.
3. Once weekly, before replacing platforms and bed boxes, decks were scrubbed with lye solution.
4. Before scattering clean sawdust, decks were sprayed with fly-repellent coal-tar creosote mixture.
5. Sticky paper pendants were kept hung from the overhead.

Dirty streets.—These often afford a place for fly breeding. Carelessness in the disposal of unconsumed food may cause the streets to become littered with particles of decomposing animal and vegetable matter. This is particularly true where wooden sidewalks are still in use, for between the cracks these food particles may fall and thus, in the dark space underneath, an ideal breeding place is established.

Ravines and other places, where there is long grass or thick vegetation sheltering rotting vegetable matter, are favorable places for fly breeding. If grass can not be cut or vegetation cleared, spraying with 0.5 per cent hellebore in equal parts of arsenite of copper (Paris green), 1 quart to 1,000 square feet, will prevent breeding.

The shores of lakes and streams should be policed at least once a week, for often, after storms or spawning, these may be covered with dead fish, in which any of the family Sarcophagidæ may breed.

Vegetable lockers should be inspected frequently and vegetables culled. It has been suggested that vegetable lockers be kept covered with tarpaulins; but this procedure is inadvisable, as it produces a dark and sheltered location and thus a more ideal breeding place. It is best to keep the lockers sheltered but open to the air and screened.

In addition to methods directed toward the prevention of fly breeding, we must also destroy the adult flies which have escaped our antibreeding campaign or have migrated from territory outside that covered by our activities. Observations at the Rebecca Light Shoals (9), off the coast of Florida, seemed to show that flies came down the wind from Cuba, a distance of 90 miles, and at times from the Marquesas Keys, 24 miles distant, and even from Key West, Fla., 46 miles away. The maximum distance traveled by the house fly, shown by these experiments, was 13.14 miles. These tests prove that fly life was not distributed to any large extent by artificial means.

Generous distribution of fly swatters, particularly in mess halls, barracks, galleys, sick bays, and hospitals, is recommended; for there

are few men, no matter how busy or sick, who can resist the temptation of swatting a fly if a swatter be accessible.

Traps must be extensively placed over the station, particularly around garbage houses, the incinerator, vegetable locker, mess halls, and other potential breeding places. Figures 9 and 10 show a simple type of trap which was used with much success. "Gut slime" seemed to be the best bait, although banana peelings, fermenting mash, and sour milk were also used.

Figure 11 shows a more elaborate trap, which has few advantages over that of more simple construction. Figure 12 shows a trap used in a campaign against the *Chrysomia macellaria* (Screw-worm fly), and is submitted through the courtesy of Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture.

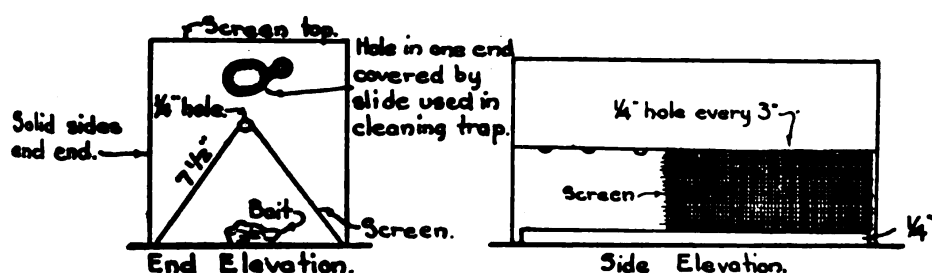


Fig. 9

Fig. 10

Trapping by means of sticky paper was the only successful method of capturing the *Stomoxys calcitrans* (biting stable fly), for they were not attracted by dead or poison baits, regardless of the fact that some observers claim that they will partake of liquid poisons. The sticky paper was made by painting strips of wrapping paper with a solution made by mixing 5 parts of resin with 8 parts of castor oil. It has been claimed that red paper is more attractive to flies than other colors; however, this was not proved by the writer's experience. The solution was heated until homogeneous, but not boiled, and then painted upon the wrapping paper strips. Strips of wrapping paper were tied around trees near potential breeding places and painted with the sticky solution. Strips 2 inches wide and of various lengths were hung from the overhead in mess halls, barns, pens, vegetable lockers, and barracks. It was demonstrated that if these strips were hung perpendicularly from the overhead, with the opposite end free, rather than hung in loops with both ends attached to the overhead, they entangled 50 per cent more flies.

Electric fly traps or fly killers, while not used by the writer, have been observed in operation and are recommended. The device con-

sists of a panel frame connected with a transformer, which is attached to any lighting circuit. The frame is crossed by rows of parallel wires which carry a current of 500 volts. This frame is placed where flies are known to congregate or made an integral part of the screen door, and as the flies are attracted by the parallel wires

they are electrocuted by the heavy voltage. The current is on at all times, but, according to the manufacturer, electricity is used only when a fly comes in contact with the wires, and then so small an amount of current is used that "one fly will not move the meter." The trap is entirely automatic and requires no attention after installation.

Chemical poisons were used with varying degrees of success. Among them were formalin, coal oil, creosote, bichromate of potash, pyrethrum, and arsenic. Formalin was used in solution, causing death by ingestion. The liquid poison was placed in shallow containers in which were floated small pieces of wood, thus making the poison fluid more easily accessible. The following formalin preparations were used:

(1) Formaldehyde.....	cubic centimeters..	4
Sugar	gram.....	1
Water	cubic centimeters..	30
(2) Formaldehyde.....	do.....	4
Aniline	do.....	1.50
Blue	minim.....	1

The bichromate of potash formula which follows was used in a similar manner as the formalin solutions.

Bichromate of potash.....	grams.....	4
Sugar	do.....	2
Water	cubic centimeters..	60

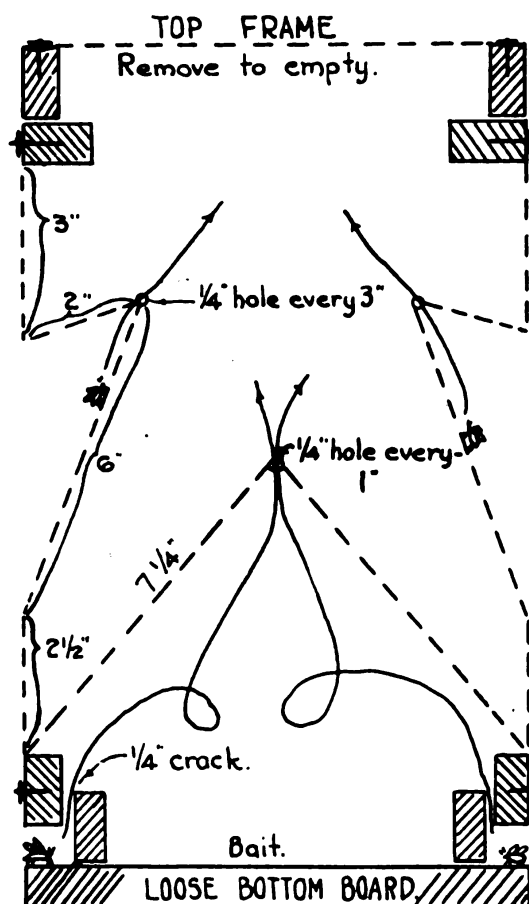


Fig. 11.

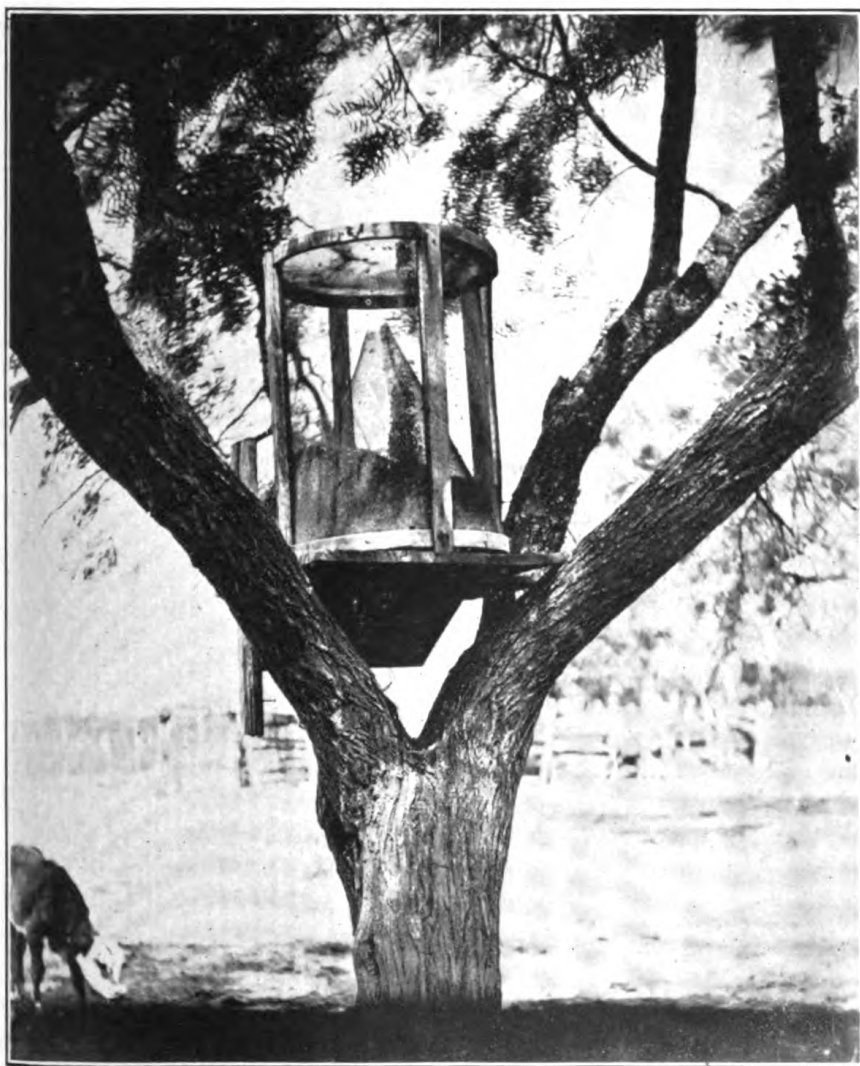


FIG. 12.—TRAP FOR SCREW-WORM FLY. (*CHRYSOMYIA MACELLARIA*.)
(FROM L. C. HOWARD)

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Due to the liquid poisons being injurious to all animal life as well as flies, they were little used.

Sprays were used with much success against the adult fly, the most successful of which was a preparation advocated by E. S. Beebe (10) containing 1 part of creosote to 6 parts of distillate of coal oil. Flies breathe through their bodies and this mixture kills them instantly. This is the essential composition of most liquid fly sprays, such as, Bug-O, Flu-Fly, Flyosan, etc. Pyrethrum powder, both as sprays and molded into small cones and burned, was also used. As the flies are not killed by this method, but only stupefied, it is necessary to sweep them up and burn them.

Through all stages of a fly's development it is subject to destruction by natural enemies. Among these enemies are ants, wasps, spiders, birds, and fungi. Of the birds that are enemies of adult flies, the tyrannidæ or fly-catcher family is the most important. To this family belongs the crested fly-catcher and 30 other species, of which the better known in the United States are the phoebe, black phoebe, pewee, and various kinds of kingbirds.

Certain fungi are destructive to adult flies and are particularly prevalent in the fall of the year. There is a dark gray fungus which kills without any noticeable alterations in the appearance of the body after death; but another fungus causing death to the adult fly leaves its body swollen and of a more or less striped appearance. These fungus diseases of the flies cease in December.

Occasionally in the examination of a house fly little reddish objects are seen upon them, particularly around their thorax. These must not be confused with a fungus disease and on close examination can be identified as mites. These parasitic mites attach themselves to the house fly and other insects. By means of their long, sharp probosces, the mites suck and live upon the flies' body juices. Regardless of the many natural enemies of the fly, they are of very little apparent assistance in keeping a station fly-free. This can only be accomplished by a most energetic ant-fly campaign, begun early and systematically followed throughout the entire fly-breeding season. It is hoped that the methods outlined in this article, which were so successfully carried out by the writer at the naval hospital, Great Lakes, Ill., will be of assistance to others engaged in the work of fly eradication.

CONCLUSIONS

- (1) Breeders and breeding materials are the real sources of all flies of a season.
- (2) Attacks directed toward eradication of the adult fly are only of secondary importance.

(3) In order to diminish the fly nuisance, the breeding must be prevented or eliminated.

(4) Coal-tar creosote oil, containing 14 to 18 per cent coal tar acids and 4 per cent bases, was the most effectual spray used in the campaign, being both a fly repellent and a larvacide.

(5) A thorough and early study of the problem must be instituted to insure a successful antily campaign.

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- (10) American City: 26:243, March, 1922.
- (11) Literary Digest: 75:29, November 18, 1922.

ACTIVITIES OF THE UNITED STATES NAVAL MEDICAL SUPPLY DEPOT

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BUILDINGS AND EQUIPMENT

Prior to October, 1918, the United States naval medical supply depot, Brooklyn, was located in the grounds of the United States Naval Hospital, Brooklyn, N. Y. On the above date it was moved to the southeast corner of Pearl and Sands Streets, Brooklyn. There are two buildings, the main building and a garage.

The main building is constructed of reinforced concrete, has eight stories, with basement, and is thoroughly modern and fireproof throughout. It occupies a plot of ground 102 feet 9 inches by 102 feet 11 inches. The floors of this building are designed to carry a load of over 200 pounds per square foot and are concrete, heavily reinforced. Two freight and one passenger elevators serve all floors. The storage floors are connected by a chute—this chute, however, has not proved practical, as many of the boxes and crates used by the depot are too large or irregular in shape: boxes containing bottles go too fast and are liable to breakage. A modern sprinkler system is installed on all of the floors for fire protection. Water, gas, and electricity are received from the city mains.

The basement is occupied by the fireroom and the carpenter shop. The fireroom is in the rear and has three boilers, small water heater, coal bins, and a small machine shop. The carpenter shop is in the front and has a full equipment of modern woodworking machinery, with storage space for lumber. Boxes, crates, and repairs to equipment can be made here.

The first floor is the receiving and shipping floor. It also has a space for the storage of inflammables and a locker space for the civilian employees.

The second floor is the supply-table issuing floor for both medical and dental items. A small alcohol and several small narcotic lockers are located on this floor.

The third floor is the nonsupply-table issuing floor. Returned stores are received on this floor, where they are checked and disposed of by survey, returned to storage, or laid aside for repairs. Special purchases are handled on this floor. Supplies sent by mail are wrapped, addressed, and franked here. Alcohol and narcotics in bulk are stored on this floor in specially built lockers.

The fourth, fifth, sixth, and seventh floors are storage floors. A part of the fifth floor is devoted to the X-ray department. This department is equipped with apparatus to test all types of X-ray and electrical equipment. There has been installed recently a room where X-ray and electrical equipment can be tested under conditions of heat and moisture approaching that of the Tropics. Both direct and alternating current are available. The dark room adjoining is equipped to test the chemicals and materials used in the development and fixing of X-ray, photographic, and electrocardiographic films and papers.

The eighth floor is given over to administrative offices. The following offices and spaces are on this floor: Commanding officer's office, assistant to the commanding officer's office, dental officer's office, general office, inspection officer's office, physical laboratory, chemical laboratory, biological laboratory, sample room, ladies' rest room, locker space for enlisted personnel, filing-cabinet space, and storage space for stationery.

The depot building is just sufficient for peace-time needs. In time of war other buildings would have to be obtained if the activities of the depot called for any degree of expansion.

The depot garage is just across Pearl Street. It has three floors with basement. Elevator service to all floors. It occupies a plot of ground 27 feet 6 inches by 100 feet. The construction of the garage is the same as the main building. The depot has three large trucks and two small ones which are housed in this building. The space not taken up by the trucks is used for the storage of non-

inflammable material for which there is not storage space in the main building.

The location of the naval medical supply depot in Brooklyn is a practical one. Nearly all of the medical supplies, with the exception of some cotton textiles, used in the Navy are manufactured in the northeastern part of the United States; that is, east of the Mississippi River and north of the Potomac and Ohio Rivers. Almost all of the larger manufacturers of medical supplies, if not directly in New York, maintain branches there. For the above reason it is logical that the naval medical supply depot, Brooklyn, should procure the bulk of the materials used by the medical department of the Navy. It is cheaper to buy materials in New York and send them to the medical supply depots, Mare Island and Canacao, than to have these depots procure their supplies locally, especially if the supplies are sent in naval ships. This applies particularly to inspections of materials and selections of grades of materials, owing to the larger quantity and number of types available for comparison in the New York market.

ORGANIZATION

The departments and subdivisions of the depot with their duties are as follows:

1. **COMMANDING OFFICER**—Captain, M. C., U. S. N.

Responsible for the proper functioning of all the activities of the depot.

2. **ASSISTANT TO THE COMMANDING OFFICER**—Chief pharmacist, U. S. N.

(a) Supervision of civilian personnel (maintenance).

- | | |
|---------------------|----------------------|
| 1. Garage. | 6. Paint shop. |
| 2. Flreroom. | 7. Elevator service. |
| 3. Box making. | 8. Shipping floor. |
| 4. Watchmen. | 9. Storage floors. |
| 5. Janitor service. | |

(b) Supervision of personnel records—naval and civilian.

(c) Supervision of receipt, routing, and dispatch of correspondence.

(d) Makes out all watch and station bills.

(e) Supervision of the carrying out of all matters of policy as directed by the commanding officer.

(f) Coordinates the activities of the depot.

(g) Supervision of storage of supplies in depot or out.

(h) Supervision of the receiving and shipping floor, with the necessary records.

3. **INSPECTION DEPARTMENT**—Chief pharmacist, U. S. N.

(a) Responsible to the commanding officer for all inspections of depot supplies.

(b) Consults with medical officers, dental officer, and with the officers in charge of the biological and X-ray laboratories in regard to inspections of materials in which they are interested.

(c) Makes inspections of material undergoing manufacture in the vicinity of the depot.

3 INSPECTION DEPARTMENT—Chief pharmacist, U. S. N.—Continued.

- (d) Supervises the correctness of specifications.
- (e) Writes specifications for special items.
- (f) Has direct charge of the physical and chemical laboratories.
- (g) Has charge of sample service.
- (h) Prepares correspondence in matters pertaining to the inspection department.
- (i) Has charge of inspection requested by the Veterans' Bureau.

4. GENERAL OFFICE—Chief pharmacist, U. S. N.**(a) Correspondence section.**

- 1. Correspondence on contracts and orders.
- 2. Prepares and keeps file cards of contracts, and orders, by dealers.
- 3. Prepares and keeps file cards of all items purchased.
- 4. Keeps follow-up file on contracts and orders.

(b) Requisition and purchase section.

- 1. Prepares depot requisitions (Form 1).
- 2. Prepares requests for purchase.
- 3. Prepares stub requisitions.
- 4. Keeps specification file.
- 5. Keeps catalogue file.
- 6. Keeps complete file Navy and Federal specifications.
- 7. Keeps daily balance of funds available for expenditure under various annual requisitions and for special purchases.
- 8. Keeps archives of requisitions, contracts, and orders.
- 9. Keeps list of acceptable bidders.
- 10. Keeps list of delinquent and debarred bidders.

(c) Receiving record section.

- 1. Checks delivery records.
- 2. Enters all deliveries on contract order folders.
- 3. Enters all deliveries on contract and order-index cards.

(d) Contract and order section.

- 1. Files dealers' invoices.
- 2. Prepares contract and order-index file cards.
- 3. Prepares contract and order folders.
- 4. Files contracts and orders.
- 5. Keeps contract and order-index file.
- 6. General routine correspondence pertaining to dealers' invoices.

(e) Voucher section.

- 1. Prepares public bills.
- 2. Keeps quarterly charge register.
- 3. Enters payment on contract and order folders.
- 4. Prepares reports of expenditure by title and appropriation.
- 5. Keeps depot stock cards and prepares maintenance reports.
- 6. Prepares all orders for X-ray films and routine correspondence pertaining thereto.

(f) Depot stock section.

- 1. Keeps daily stock record.
- 2. Keeps record of stock stored in outside buildings.
- 3. Prepares expenditure slip for depot use and test.

4. GENERAL OFFICE—Chief pharmacist, U. S. N.—Continued.

(g) Stock-accounting section.

1. Keeps record of articles taken into stock.
2. Keeps record of and adjusts stock prices.
3. Keeps record of all issues of stock by account numbers.
4. Enters prices of issues on all requisitions.
5. Prepares recapitulations of issues and quarterly report (Form V) for bureau.
6. Keeps record of and reports daily, material required for replenishment of stock.

(h) Shipment section.

1. Prepares all bills of lading.
2. Records all bills of lading.
3. Checks, accomplishes, and files all incoming bills of lading.
4. Traces lost shipments.
5. Mails out third copies of filled requisitions. (Shipping information copy.)
6. Prepares F. T. B. monthly reports of bills of lading.
7. Keeps records of shipments to supply bases, navy yards, etc.

(i) General file section.

1. Correspondence files.
2. Cross index of all correspondence, reports, and return circular letters.
3. Multigraphing and mimeographing of internal forms and circular letters.
4. Files all accomplished supply depot requisitions. (Form 4.)
5. Keeps return stores file.
6. Mails out first and second copies of accomplished supply depot requisitions. (Form 4.)

(j) Supply depot requisition section.

1. Receives, records, and corrects all supply depot requisitions. (Form 4.)
2. Prepares special issue requisitions and requisitions to cover items transferred from requisitions.
3. Keeps record of all requisitions received and ultimate disposition.
4. Keeps depot's (maintenance) stock of stationery.

5. SUPPLY TABLE ISSUE FLOOR—Chief pharmacist, U. S. N.

1. Fills and supervises the packing of all supply table requisitions.
2. Keeps necessary records pertaining to supply table issues.
3. Has charge of narcotic locker (second floor).

6. NONSUPPLY TABLE ISSUE FLOOR—Chief pharmacist, U. S. N.

1. Fills and supervises the packing of all nonsupply table requisitions.
2. Receives and accounts for all returned stores.
3. Receives and packs all special purchases.
4. Assembling and repair service.
5. Manufactures items for field supply table outfits.
6. Receipt and issue of blank forms.
7. Mailing department.
8. Preparation of requisitions when necessary.
9. Has charge of liquor and narcotic locker (third floor).

7. **PHYSICAL LABORATORY**—Chief pharmacist, U. S. N.
 1. Physical tests of medical supplies as directed by the inspection officer.
 2. Veterans' Bureau inspections.
8. **CHEMICAL LABORATORY**—Chief pharmacist, U. S. N.
 1. Tests drugs, chemicals, etc., as directed by the inspection officer.
 2. Veterans' Bureau inspections.
9. **BIOLOGICAL LABORATORY**—Chief pharmacist, U. S. N.
 1. Stores, issues, and accounts for biologicals.
 2. Prepares correspondence in regard to biologicals.
 3. Has charge of correspondence and issue of all microscopical and biological laboratory supplies.
 4. Prepares specifications for microscopical and biological materials.
 5. Makes sterility tests upon request of inspection officer.
 6. Prepares culture media. (Field outfits.) (Special requests.)
10. **X-RAY DEPARTMENT**—Chief pharmacist, U. S. N.
 1. Inspects and tests all X-ray and special electrical material and, when necessary, such tests as may be requested by the inspection officer.
 2. Prepares specifications for X-ray and special electrical apparatus procured by the depot.
 3. Prepares specifications for the above materials, purchased by naval hospitals and stations, when requested by the bureau or the activity concerned.
 4. Prepares correspondence in regard to X-ray and special electrical apparatus.
 5. Does all necessary tests upon new material recommended for adoption in the service.
11. **DENTAL DEPARTMENT**—Lieutenant commander, D. C., U. S. N.
 1. Acts in an advisory capacity to the commanding officer in all matters pertaining to dental supplies.
 2. Supervises the preparation of requisitions and specifications for dental supplies.
 3. Acts in an advisory capacity with the inspection officer in the inspection of dental supplies.
 4. Prepares correspondence in regard to dental supplies.
 5. Has charge of dental issue room.

A proposed organization chart follows:

PERSONNEL

1. UNITED STATES NAVY.

(a) Officer personnel:

- 1 captain, M. C., U. S. N.
- 1 commander, M. C., U. S. N.
- 1 lieutenant commander, D. C., U. S. N.
- 10 chief pharmacists, U. S. N.

(b) Enlisted personnel:

- 11 chief pharmacist's mates.
- 2 pharmacist's mates, first class.
- 1 pharmacist's mate, second class.

2. CIVILIAN PERSONNEL.**(a) GROUP II.**

1 laborer (classification, janitress).

(b) GROUP III.

1 head mechanic (depot).

1 letterer and grainer (painter).

1 joiner (carpenter).

1 machinist (garage).

1 boxmaker.

5 packers.

3 firemen.

3 chauffeurs.

(c) GROUP IV-B—CLERICAL.

1 (A) chief clerk.

1 (C) bookkeeper.

1 (C) file clerk.

2 (C) clerks.

5 (C) stenographer and typist.

2 (C) typist.

(d) GROUP IV-B—SUBCLERICAL.

1 (A) head stockman.

2 (C) stockmen.

1 (D) stockman.

16 (M) storemen.

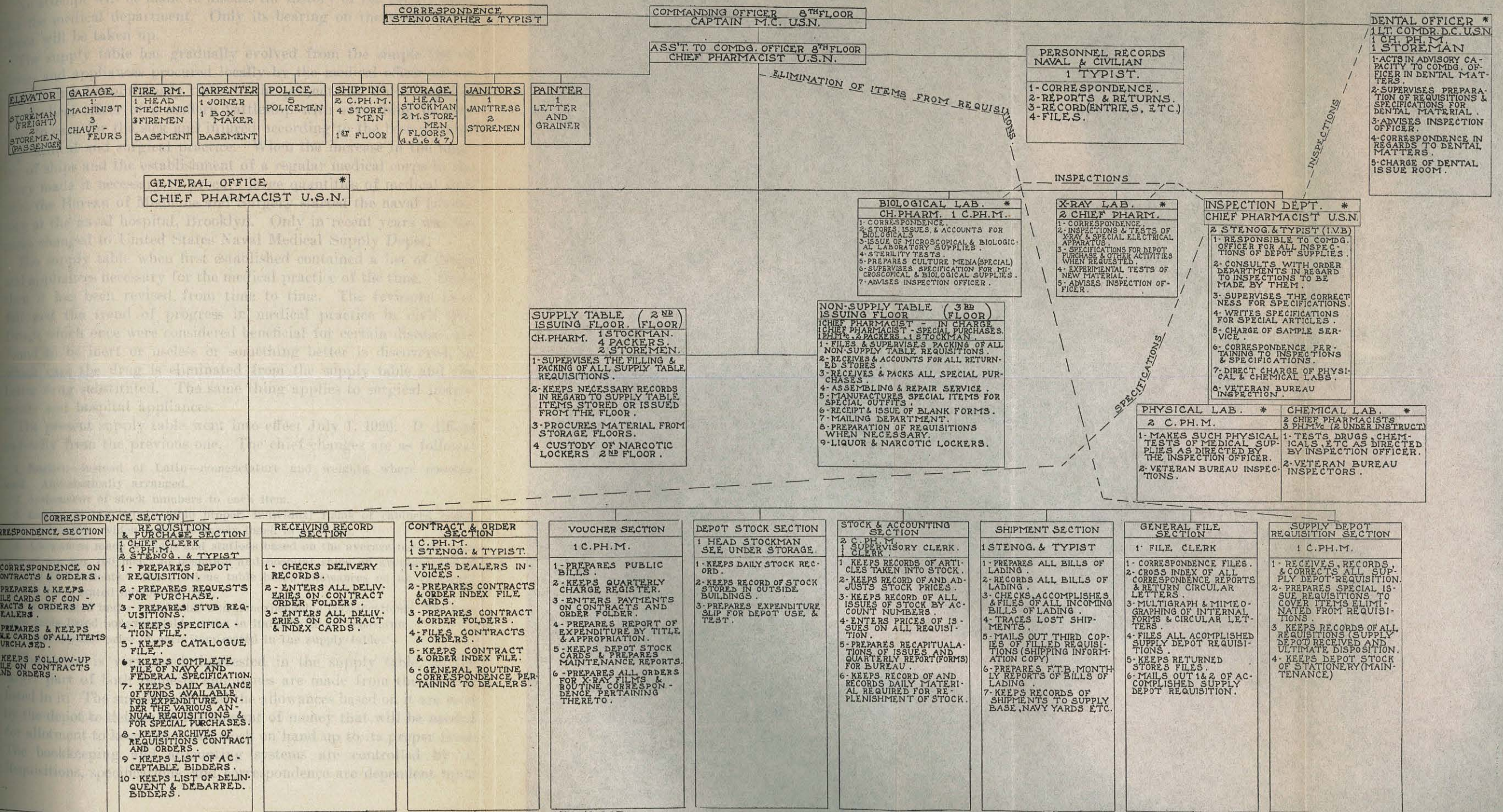
(e) GROUP IV-B—POLICEMEN.

5 (O) policemen.

The enlisted personnel listed above are detailed to the general office, inspection department, issuing floors, dental department, and the receiving and shipping floor. Their detail to these departments is necessary because of the need for personnel familiar with the technical names and uses of the material handled by the depot. These enlisted men (chief pharmacist's mates) have had years of experience in handling and caring for medical supplies in the naval service and can be relied upon to check requisitions, invoices, surveys, etc., as to correctness of names and amounts. If it were not for these chief pharmacist's mates the depot would have to procure civilian personnel of a clerical type difficult to obtain from the civil-service list, and even then with the added knowledge it would take years for them to become proficient in the duties assigned them.

The civilian personnel is used for the maintenance of the depot (Group II, Group III, and Group IVb—Policemen) and for the necessary clerical and manual labor needed in the storage, packing, labeling, and transportation of medical supplies. The name under each group indicates the duties they perform. A number of these men have been with the depot for years. The depot has now barely enough civilian personnel to carry on its work. The expansion caused by the World War has been entirely eliminated.

ORGANIZATION
U.S. NAVAL MEDICAL SUPPLY DEPOT.
BROOKLYN, NY.



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SUPPLY TABLE

No attempt will be made to discuss the history of the supply table for the medical department. Only its bearing on the work of the depot will be taken up.

The supply table has gradually evolved from the simple list of drugs and appliances procured locally by the medical officer of the ship during Revolutionary times to the present list which supplies the medical officer of a modern battleship with everything he may need to care for the sick and injured according to the best present-day medical and surgical practice. When the increase in the number of ships and the establishment of a regular medical corps in the Navy made it necessary to procure large quantities of medical supplies the Bureau of Medicine and Surgery started the naval laboratory at the naval hospital, Brooklyn. Only in recent years was the name changed to United States Naval Medical Supply Depot.

The supply table when first established contained a list of drugs and appliances necessary for the medical practice of the time. Since then it has been revised from time to time. The revisions have followed the trend of progress in medical practice in civil life. Drugs which once were considered beneficial for certain diseases are found to be inert or useless or something better is discovered, in which case the drug is eliminated from the supply table and the better drug substituted. The same thing applies to surgical instruments and hospital appliances.

The present supply table went into effect July 1, 1926. It differs radically from the previous one. The chief changes are as follows:

1. English—instead of Latin—nomenclature and weights, where possible, used. Alphabetically arranged.
2. Assignment of stock numbers to each item.
3. Listing in the supply table proper, individual items of cabinets, cases, rolls, and outfits, which were previously listed in Part III.
4. Allowances made to ships and stations based on the average use—average rate of use per 100 men; to hospitals and hospital ships on average rate of use per 100 patients. The previous table based allowances on an arbitrary amount for a stated number of men.
5. Items listed under expendable and nonexpendable classifications. The previous table listed nonexpendable items in italics without separation.
6. Approximate price of each item stated in the supply table.

The depot is very much interested in the supply table, as the larger part of both requests and issues are made from the articles listed in it. The supply table and the allowances based on it are used by the depot to determine the amount of money that will be needed for allotment to keep the depot stock on hand up to its proper level. The bookkeeping and accounting systems are controlled by it. Requisitions, specifications, and correspondence are dependent upon

it. Cabinets, rolls, cases, special outfits, and commissioning outfits are made up according to the allowances stated in it.

There are, of course, many articles used by the medical department that are not on the supply table. They may be such things as are used by hospitals alone, such as orthopedic apparatus. Or they may be particular apparatus or drugs used for some particular purpose, such as rebreathing apparatus for aviation activities, or Coley's fluid for the treatment of a sarcoma case. The request may be for some drug or instrument which has not yet demonstrated its worth but which has received considerable mention in the medical literature and is asked for by an activity, with the approval of the bureau.

Articles on the supply table are issued by the depot upon proper requisition from the activity concerned without approval of the Bureau of Medicine and Surgery. Those not on the supply table, or excessive amounts of articles on the supply table, must have the approval of the Bureau of Medicine and Surgery before they are issued by the depot.

It might be well to call attention to the fact that the present supply table lists separately all the items contained in special cabinets, cases, rolls, and outfits as well as the complete cabinets, etc. The separate items are really replacement items and should not be included in requisitions where the complete cabinet is asked for.

The depot experiences considerable difficulty in filling requisitions promptly, due to lack of care on the part of the activity making out the requisition, especially where supply table items and nonsupply table items are mixed together. When this occurs the depot has to separate the items and make out new requisitions. Unless the different classes are separated in some way the depot has difficulty in checking requisitions for accounting purposes. Where a large number of items are asked for it would be advisable to have several requisitions made out, instead of one, in order to do away with the large number of sheets that will have to be fastened together if only one requisition is submitted.

For a more complete description of the supply table attention is called to an article "The Supply Table of the Medical Department. United States Navy," by A. B. Montgomery, chief pharmacist. U. S. N. (Naval Medical Bulletin, July 1926, p. 497.)

ALLOTMENTS

Allotments are made to the depot by the Bureau of Medicine and Surgery under two headings:

1. Depot maintenance.
2. Medical stores.

The first covers all expenditures estimated for the maintenance of the depot and includes both supplies and repairs.

The second covers the minimum amounts of articles to be kept on hand as determined by the experience of the depot and approved by the bureau. The depot, from records of issue for previous years and from anticipated demand, determines the amount of each item on the supply table that should be carried in stock at all times. For items not on the supply table issues for previous years are considered and included in the allotment requested. The depot, prior to the 1st of March each year, sends to the bureau an estimate of the amount of money needed by the depot for the coming year. It also recommends how this amount should be divided for expenditure during each quarterly period. The bureau at the beginning of the fiscal year forwards to the depot an allotment card showing the total amount of money allotted for the year, the appropriation number, the Bureau of Medicine and Surgery allotment number, and the amount allotted for each quarter. These amounts can not be exceeded by the depot without authority of the bureau.

The bureau makes these allotments available for expenditure under various subheads for accounting purposes. At the present time the allotments are divided as follows:

FISCAL YEAR 1927

Allotment No. 77801-219, Maintenance

Reqn.	Subhead	
1	14-40	Repair of depot labor-saving devices.
2	14-41	Repairs to motor vehicles.
	14-18	Transportation supplies and services.
3	14-08	Chemical, physical, bacteriological, and X-ray laboratory (supplies).
	14-40	Chemical, physical, bacteriological, and X-ray laboratory (repairs).
4	14-34	Miscellaneous supplies and services.
5	14-43	Removal of ashes, garbage, and refuse (annual contract).
6	14-28	Packing materials.
7	14-21	Gas.
	14-23	Electricity.

Allotment No. 77801-220, Medical stores

Reqn.	Subhead	
	14-24	Water.
8	14-40	Repairs to machinery and equipment.
	14-35	Repairs to buildings and appurtenances.
	32-67	Purchase of machinery and tools.
9	34-40	Medical Department repairs (except dental).
10	34-06	Drugs and medicinal preparations.
11	34-07	Surgical instruments and appliances (expendable).
	34-60	Surgical instruments and appliances (nonexpendable).
12	34-07	Surgical dressings.

Reqn. Subhead

- 13-----34-07-----Hospital stores, hospital and nursing appliances (expendable).
 34-60-----Hospital stores, hospital and nursing appliances (non-expendable).
 14-----34-08-----X-ray supplies (expendable).
 -----X-ray equipment (nonexpendable).
 15-----34-08-----Dispensary, laboratory, and microscopical supplies (expendable).
 34-60-----Dispensary, laboratory, and microscopical supplies (non-expendable).
 16-----34-08-----Chemical reagents and laboratory supplies.
 17-----34-10-----Dental supplies (expendable).
 34-64-----Dental equipments (nonexpendable).
 34-40-----Dental repairs.
 18-----34-08-----X-ray films (annual contract).
 19-----34-06-----Typhoid vaccine (annual contract).
 20-----34-06-----Biologicals (annual contract), also special purchase.

The depot enters on its public bills, in addition to the allotment numbers, the Bureau of Supplies and Accounts accounting numbers; 12—Title O, for maintenance; 13—account 8, for medical stores.

The depot makes a report to the Bureau of Medicine and Surgery each quarter showing expenditure under each allotment.

REQUISITIONS

The Medical Department, in common with other departments of the Navy, has to procure its supplies through the Bureau of Supplies and Accounts or its district purchasing pay office.

All purchases of medical supplies are made by the Bureau of Supplies and Accounts or its district purchasing pay office upon the receipt of a completed Bureau of Medicine and Surgery requisition Form 1. (NMS 1.) This requisition is made out in the depot and forwarded to the Bureau of Medicine and Surgery, where it is approved, disapproved, or modified and then forwarded to the Bureau of Supplies and Accounts for directions as to purchase.

Each requisition is given a depot serial number for the fiscal year. An original and four copies—more if necessary—are filled in, the original being signed by the commanding officer of the depot. Each copy, but not the original, has entered upon it the estimated cost of each item. This estimated cost obligates the money until the transaction is completed and the money can not be used for any other purpose. If the lowest acceptable bid is over 10 per cent above the estimated cost, authority has to be obtained from the Bureau of Medicine and Surgery for an increase in the estimated cost. If the estimated cost is higher than the accepted bid the money is taken back on the books when the award is made and is available for expenditure for other items.

The Bureau of Medicine and Surgery enters on each requisition the appropriation number when it is received in the bureau. It then retains a green copy for its files.

When the requisition is received in the Bureau of Supplies and Accounts the Paymaster General directs that the purchase will be made by the Bureau of Supplies and Accounts or by the naval district purchasing pay office concerned—usually the third naval district. Purchases for very large amounts—over \$5,000—or those made in common with other departments of the Government are usually made by the Bureau of Supplies and Accounts or supervised by that bureau. Smaller purchases are made by the district purchasing pay office. Wherever made the yellow copy is sent to the General Accounting Office and a green copy retained for their files. The original is returned to the depot.

A list of acceptable bidders is included in every requisition. This list is taken from a file kept in the depot and may be added to by the Bureau of Supplies and Accounts or the purchasing pay office from the files in their offices. The only list of dealers that can not be added to is that for drugs. Jobbers and dealers in drugs must state the name of the manufacturer in their bids. Drugs are exempt by law from advertisement. The word "acceptable" is used, as a bidder who was acceptable at one time may not be at another on account of being in debt to the Government or because of some irregularity in previous contracts.

The depot at times requests the purchasing pay office (direct) to purchase articles on annual approved requisitions. This is done in the form of a letter stating the article required, the specification for it, the requisition number, and a list of acceptable bidders.

Items of medical supplies—stationery, etc.—carried in stock at the naval supply base are procured on letter request and are invoiced to the medical supply depot on S. & A. Form 71.

Perishable supplies like X-ray films and biologicals can not be stored for any length of time without deterioration. They are procured on annual contracts. Purchases are made as required upon requisition from the activity using them.

The purchasing pay office or the Bureau of Supplies and Accounts handles all details in regard to advertising, awards of bids, and legal matters pertaining to contracts, the naval medical supply depot acting only in an advisory capacity when the award is made. The recommendation of the depot is always followed unless it is in conflict with some law or regulation. Stub requisitions are used for depot maintenance only.

SPECIFICATIONS

The most important part of each requisition is the description or specification of the articles asked for. Each item on the requisition must be carefully described in order that the bidder, the purchasing pay office, and the inspection officer may understand what is required of them. In order to comply with the law requiring competition, the specification must be so worded as to avoid, where possible, naming or describing articles that are proprietary in nature or that can be obtained from only one source. Where possible, specifications are written to cover articles of common commercial size, weight, or manufacture in order to secure competition among bidders and to prevent increasing the cost due to the manufacturer having to fabricate special dies or containers when the article requested is not of common commercial manufacture.

The depot writes its own specifications and, where possible, inserts or uses the specifications issued by the Navy Department or the Federal Specifications Board. Each specification must describe accurately and minutely the article requested, giving detailed measurements, quality of material, inspection tests, methods of marking and packing, shipping instructions, and any other instructions that may be necessary. The description may be very simple—merely the name—as in the case of surgical instruments that are named after the originator but yet are made by many firms. Or it may be elaborate and require many closely typed pages of description and instructions when the article is an instrument of precision requiring accurate measurements.

Where the demands of the service require a proprietary article a notation is made on the requisition that "the above article and no other will answer the necessities of the service." The reason for such purchase must be stated on the requisition.

When service activities submit a requisition for articles not listed on the supply table they can assist the depot materially if they will incorporate in their requisitions as complete, yet concise, a description as possible of the articles they desire. Such information as catalogue numbers, maker's name, place of manufacture, and other available data aids the depot to procure the kind or type of article requested by the activity. Requisitions for electrical apparatus, if not accompanied by specific data as to voltage, amperage, phase, cycle, etc., are of little value to the depot and cause needless correspondence.

The depot, owing to the law regarding proprietary articles, may not be able to procure the exact item requested by the activity unless it is the only article of its kind procurable. For this reason service activities should furnish the depot with all the data at their com-

mand so that the depot may be able to state the facts when the purchase of proprietary articles is necessary, or to procure an article that will meet with requirements although not the same item requested by the activity.

INSPECTIONS

Inspection of materials is an important function of the depot. Owing to the policy of the Government in regard to economy, it is important that purchases be made of articles that will be satisfactory to the medical officers using them and still be reasonable in cost. Nearly every item on the supply table or otherwise can be purchased in the open market with varying quality of material, finish, and workmanship. It therefore becomes the duty of the inspection department to examine the article to ascertain if it meets the requirements of the service and is up to the level of the specification of the proposal. There have been deliveries of drugs which, if allowed to pass without inspection, would have caused serious damage, if not death, if given to patients. X-ray apparatus has been rejected where it has been found defective and would not have given the proper service if it had been installed—most probably at a station overseas. Instruments of precision, like pipettes and thermometers, have been found defective due to inaccurate markings.

Grades of paper, glass, rubber, textiles, etc., can not be determined by superficial inspection but must be accurately tested for adulterations, strength, etc., by standard tests and apparatus. The inspection department of the depot is fully equipped to do this.

A chief pharmacist is in charge of all inspections and is responsible for the acceptance or rejection of each delivery of medical supplies to the depot. The officer now at the depot has had years of experience in this work and, with the assistance of the officers in charge of the X-ray and biological laboratories, is equipped to make necessary tests and inspections of all articles procured by the depot. He is in direct charge of the physical and chemical laboratories with competent men under him to do the necessary work. He also has supervision over the correctness of specifications and, when necessary, writes specifications for special items.

During the past year the depot was requested to make inspection of medical supplies for the Veterans' Bureau. The depot was able to comply with this request with a slight increase in personnel and practically no increase in laboratory facilities. The depot receives the materials, makes the inspections, and recommends either acceptance or rejection, the Veterans' Bureau handling all other details. Up to the present time this work has progressed smoothly and without friction of any kind.

Each purchase delivered at the depot passes through the receiving department, where it is inspected and a record made of the name of the firm delivering it, the name of the article, the time of delivery, and the condition of the shipment.

If it is a small shipment of a few items the entire delivery is then sent to the physical laboratory, where it is inspected as to containers, packing, labeling, wrapping, etc. When this is finished the article is sent to the appropriate laboratory for special inspection and test, if this be necessary.

Large shipments or bulky articles are held on the receiving floor and either inspected there or such part sent to the inspection department as may be required by the officer in charge of inspections. The specification usually states what percentage of the shipment will be inspected when the shipment is large.

No articles are sent to the storage floors or issuing floors until accepted by the inspection officer and approved by the commanding officer. Articles rejected by the inspection officer are held subject to removal by the contractor. It is not customary for the depot to accept part of a shipment if it be found that a majority of the tests show defective material or workmanship; the contractor is required to remove the whole shipment. Occasionally a firm is allowed to replace defective articles where it is found that only a very few of the articles are defective.

The physical laboratory is equipped to do inspection and tests of the physical properties of rubber goods, textiles, paper, glass, etc. Instruments of precision may be tested here, e. g., pipettes, thermometers, sphygmomanometers, etc. Experimental tests on the aging of rubber goods and adhesive plaster are carried on in order to determine the best methods of storage and preservation.

The chemical laboratory is equipped to do the tests required by the Pharmacopœia and, in addition, such tests as may be required for special articles. For example, catgut ligatures are examined here for free chromic acid, while tensile strength and size are tested for in the physical laboratory.

The biological laboratory does tests for sterility of ligatures and any other material that requires such tests. It has supervision over the inspection and issue of all serums, vaccines, and other biological material. Material for culture media is inspected and culture media made for special outfits in this laboratory.

The X-ray department inspects and tests all X-ray supplies delivered at the depot and also, when necessary, apparatus under manufacture in the vicinity of the depot. It is prepared to inspect and test ultra-violet therapy lamps, high-frequency apparatus, and other special electrical installations. The dark room attached to this

department is a model installation and is being adopted by our larger hospitals. This department draws up specifications for all electrical apparatus purchased by the depot and, when requested by the bureau, for electrical equipment for naval hospitals and stations. This department is now prepared to test X-ray and electrical apparatus under conditions of heat and moisture approaching that of the Tropics. It is expected that this will prevent shipment of material to the Tropics that would not withstand tropical moisture and heat.

PAYMENTS FOR MEDICAL SUPPLIES

Payments for medical supplies delivered at the depot are made by the disbursing officer of the Bureau of Supplies and Accounts or the disbursing officer of the third naval district, according to where the requisition was placed.

Public bills are made out by a clerk in the general office of the depot. The authority for the accomplishment of the public bill is the receiving floor record, which contains the name and number of the item or items, the name of the firm delivering the material, date of delivery, number of requisition, acceptance of the material by the inspection officer, and the approval of the commanding officer. This receiving floor record is checked against the invoice of the dealer, the requisition and the S. & A. order Form 105, or the contract, to see that the item received is the same as that called for by the requisition and order form or contract. The dealer's invoice is checked to determine its correctness as to name or trade description of the article and the price; also whether it is properly certified to and signed by a member or officer of the firm as required by law. Discounts for payments within specified times are carefully noted and are taken advantage of wherever possible. Sometimes discounts can not be taken advantage of—in case of annual contracts where receipts for material are not sent to the depot in time to prepare the public bill within the specified time. Only discounts entered in ink or typed in on the face of the dealer's invoice, or as part of a contract agreement, are considered.

Each public bill is given a depot serial number for the fiscal year. The contractor's name and address, the Bureau of Medicine and Surgery allotment and subhead numbers, the appropriation number, the requisition number, the Bureau of Supplies and Accounts accounting number, the name of the item, the price, and any other pertinent data are entered upon the public bill. The public bill is then checked by the officer in charge of the general office and placed before the commanding officer for signature. It is then sent to the proper disbursing officer for payment.

A note is placed on all public bills showing to which public bill the original requisition is attached. When the final delivery is made the public bill last submitted completes the payment under the requisition and it is so stated on the public bill. A note is also placed on the public bill if any item of the requisition is canceled.

Discounts, if accepted, are entered on a separate line from the items but are subtracted when the total amount to be paid is entered.

Total amounts are entered in ink and typed in, both in figures and words.

An original and five copies are sent to the disbursing officer. The commanding officer signs only the original.

The public bill becomes a final check as to material entered on the books by the bookkeepers as to amounts and prices.

ISSUES BY THE DEPOT TO MEDICAL ACTIVITIES

Issues were previously made by the depot to medical activities on requisition Forms B, B—dental, Ba and 4, and by letter. Since July 1, 1926, all of the forms, except Form 4, have been discontinued.

Form 4 is now used for both medical and dental items whether listed on the supply table or not. Form 4 requisitions for supply table items do not require the approval of the Bureau of Medicine and Surgery, unless in excess of allowance. Form 4 requisitions for nonsupply table items require the approval of the bureau. The Manual for the Medical Department of the Navy requires that these requisitions be numbered by the activity with serial numbers for the fiscal year. If for any reason the bureau, or the depot, has occasion to split up the requisitions, and a new requisition is made out, this requisition is given a half number. Each number is preceded by the letters S. D.

When requisition Form 4 is received in the depot it is checked for accuracy, for excess of allowance, and as to whether the items are on the supply table or not. Inaccuracies are corrected and the requisition is sent to the second floor if the items are on the supply table; to the third floor if the items are nonsupply table. The officers in charge of these floors then have the items collected, subjected to three checks, and packed. They then have the boxes or crates properly marked and the address checked for correctness. If some of the material is not in stock, the commanding officer is notified and necessary steps are taken to procure the articles. When the material is collected and packed the requisition is sent to the general office to have the items entered on the books as having been issued. to be priced, and to have bills of lading made out.

Requisitions for nonsupply table items are checked against the books to find out if the material is in stock or if there are any other

materials which could be used in its place. If not in stock, then an open-purchase requisition is submitted for its procurement.

An original and three copies are required of Form 4. The price of each item is entered on the first and fourth. The fourth is retained in the depot as a file copy. The third is attached to the bill of lading and with the first and second is returned to the activity forwarding the requisition. The first is returned to the depot after signature by the officer receiving the material and is the depot's receipt for the supplies.

Material on annual contract, e. g., X-ray films and biologicals, are issued by the depot on letter request. Accounting is done by the issue of an emergency issue invoice. These invoices are also used when a partial shipment is made on a requisition. These invoices when receipted and returned to the depot are receipts for the material.

PACKING

The depot has its own box-making plant where boxes and crates are made as may be necessary. Whenever possible medical supplies are shipped from the depot in the boxes in which the supplies were received from the contractor. This is only possible when the requisition calls for enough of the item to cover the contents of the box or case. Ordinarily the majority of requisitions received in the depot are for small quantities of many items. This makes it necessary to break down the original boxes and to pack the items in a box made at the depot.

Acids, inflammable material, and explosives have to be packed in such special packing material as may be required by the regulations of the Consolidated Freight Classification (latest edition). The officers in charge of the issuing floors are responsible for the method and kind of packing used. The packers employed on these floors have been with the depot for many years and are thoroughly acquainted with the various methods of packing to be used for the special materials mentioned above.

Excelsior, corrugated cardboard, sawdust, and asbestos wool are used as packing materials.

The depot makes its own boxes and crates rather than buy knocked-down boxes, because of the varying sizes and shapes of the materials issued by the depot. X-ray machines, dental engines, medicine and dental cabinets, etc., require special sized crates.

SHIPMENTS

Incoming.—All medical supplies procured from civilian sources are delivered f. o. b. the depot. They are received and receipted for by the shipping clerk.

Medical stores received as returned stores or from another Government activity are received on a Government bill of lading. The shipping clerk signs the way bill of the carrier as a receipt. The commanding officer signs the original of the bill of lading, which is surrendered to the last carrier.

Outgoing.—The procedures leading up to the bill of lading will be briefly outlined.

When a requisition has been filled and packed the officer in charge of the issuing floor fills in a depot memorandum form "Supplies ready for shipment" and sends it to the shipping clerk. Upon this form is entered the requisition form and number, name of activity, and a concise description of the articles contained in the shipment. The shipping clerk consults the "Consolidated Freight Classification" (latest edition) and any instructions from the Bureau of Supplies and Accounts and sends the form to the general office with a memorandum attached showing freight classification, route to be shipped, weight, and cube. From the information contained in the form and the memorandum a bill of lading is made out by a clerk in the general office. All shipments by rail, water, or express require a bill of lading.

Government transportation stock Forms 5, 6, and 7 are required to complete a bill of lading transaction. Form 5 is the original. Form 7 is the shipping order. Form 6 (yellow copy and as many blue copies as may be necessary) is a memorandum form. The same data are entered on each of the forms. The original with two blue copies is sent to the consignee. The shipping order is the only form signed at the depot and is the carrier's authority to transport the material. The yellow memorandum copy goes to the Bureau of Supplies and Accounts. A blue memorandum copy is sent to each activity concerned, where two or more activities in one district are sent materials, in care of the supply officer, on one bill of lading: also where transshipments are required.

The bill of lading when complete must contain all the information required by the reverse of the original of the bill of lading. Some of the material issued by the depot—acids, inflammables, etc.—are required by the Consolidated Freight Classification to be specially packed, labeled, and shipped. These facts must be noted on the bill of lading. Sometimes it is difficult to assign a freight classification owing to a number of different classes being packed in the same box—the class requiring the highest classification usually determines the classification to be used. Drugs are usually classed as medicines NOIBN (not otherwise indicated by name). Machines are designated as S. U. (set up) or K. D. (knocked down).

Wherever possible, shipments are sent by water, as this is usually cheaper than by rail. The cheapest route is always selected. Ship-

ments by rail require a statement of the weight; those by water require both weight and the cubic measurement.

Whenever shipments exceed 5,000 pounds, authority for shipment and instructions as to route have to be obtained from the Bureau of Supplies and Accounts. Weights up to this amount may be shipped by the depot without consulting that bureau.

When the bill of lading is completed in the general office it is sent to the shipping clerk, who makes arrangements to have the material sent to the carrier as called for in the bill of lading. Motor trucks belonging to the depot transport the material to the proper pier, railroad station, or express office. When the material is delivered to the proper carrier the shipping clerk obtains the signature of the agent of the carrier on all copies of the bill of lading, except the shipping order, as the depot's receipt for the material. The shipping clerk then completes the depot form by entering on it the date of shipment, to whom shipped, the name of the carrier receiving it, the number of pieces, the freight classification, the weight, and cube. This form is then attached to a blue receipted copy of the bill of lading and is sent to the general office for file.

The depot on the 1st of each month sends to the Federal Traffic Board a "Report of bills of lading issued," showing all bills of lading issued during the previous month.

All payments for transportation of materials shipped from the depot on Government bills of lading are made by the Bureau of Supplies and Accounts under appropriation controlled by that bureau.

Shipments of small packages, blank forms, or individual books may be made by mail. Only packages under 4 pounds may be franked. Packages over 4 pounds and up to 14 pounds may be sent by prepaid postage. The depot has a yearly allowance, on requisition, from the office of the Secretary of the Navy for this purpose. Prepaid postage is not used except for biologicals and other emergency supplies where prompt delivery is urgent.

RETURNED STORES

The depot receives from time to time medical supplies that have been surveyed by the various activities of the Medical Department or from ships and stations that have been put out of commission. These medical supplies are taken up by the depot as returned stores. They are carefully checked and inspected. If they are fit for reissue they are placed in the depot's stock. If useless and of no value they are surveyed and recommended to be destroyed. If damaged, but capable of being repaired, they are laid aside until sufficient quantities have accumulated, when they are sent out for repair. The

depot saves considerable money yearly by the repair of slightly damaged material. Metal parts that are of no use are sent to the navy yard scrap pile.

RETINITIS PIGMENTOSA

WITH REPORT OF CASE

By C. B. CAMERER, Commander, Medical Corps, United States Navy

In venturing to present a brief résumé of our knowledge of this rather rare and very serious optical affection one is struck by the paucity of data available, case reports being infrequent and material in the literature all too scarce. Therefore recourse is necessarily had to such standard works on ophthalmological disease as are procurable for a description of this entity, due acknowledgment being hereby given, supplemented by a report of a case coming under the personal observation of the writer.

Retinitis pigmentosa is a slowly progressive, degenerative disease of the retina, characterized by gradual failure of vision, hemeralopia, disorientation, and final total blindness. Treatment is of no avail and prognosis is hopeless. The condition is invariably bilateral. Consanguinity is present in over one-fourth of all cases reported. Heredity and possibly lues, either congenital or acquired, further aggravated by poor general tone, exhaustion, exposure, occupational retinal irritation (excessive light, such as acetylene, etc.), and excesses are all considered as contributory. The male sex is most frequently affected and heredity, especially through the male lines, plays an important part. It is often found coexistent with other congenital anomalies; e. g., stigmata, feeble intellect, polydactylism, etc., or other ocular manifestations, such as persistent hyaloid artery, posterior polar cataract, etc.

The subjective symptoms are so characteristic that the diagnosis can usually be made thereby without even an ophthalmoscopic examination being necessary. One of the outstanding symptoms even in young subjects is their inability to see well in the presence of poor illumination, particularly at night (hemeralopia). This symptom is progressive in direct ratio to the patient's increasing age; hence it becomes eventually impossible for them to go about after nightfall while still being able to see quite well during the day.

Early in the disease the visual fields, when plotted with good illumination, present a uniformly broad blind zone (ring scotoma) between the center and periphery; central vision is usually good, inasmuch as the periphery is still functioning; orientation is also good, the ring-like scotoma being suppressed. However, the periph-

ery, while still functioning, is hyposensitive, and in case of under-illumination this function ceases, causing this portion of vision to disappear precisely as in the area corresponding to the annular scotoma, leaving only the small central portion around the fovea still able to carry on. Hence in feeble light, such as after nightfall, etc., orientation becomes impossible. It will be found upon study of the case that even this central portion is below par, because the "light sense" in general is much reduced with a corresponding increase in liminal stimulus.

Progressively the retinal periphery ceases to function, complete blindness in this area occurring, gradually narrowing down to a small central functioning portion of the retina, even in a good light (tubular effect), the patient being unable to orient himself; but, at the same time, this small remaining area may function so well that he can still perform fine, close work. This power, unfortunately, gradually is lost as well, complete blindness eventually supervening, the latter, however, not as a rule occurring until late in life, usually by the sixth decade and thereafter.

In some cases the principal cause of poor vision will be found to be a cortical cataract, and as its densest and most opaque area corresponds to the pupillary center, a contracted pupil, as in strong light, will mechanically impair vision, thus forming an exception to the general rule that all cases of retinitis pigmentosa see better in a strong light, and will be materially helped by dilatation of the pupil by atropin, homatropin, etc., the patient being thus in a position to see around the lenticular opacity, so to speak.

Ophthalmoscopic examination of the retina shows the characteristic black spots, likened to spiders or bone corpuscles, connected by their processes and especially noticeable along the courses of the veins, which latter, as well as in the retinal arteries, show a progressive narrowing. These "spots" tend to increase in number as time passes, the circle gradually narrowing down and around the disk. Pigmentary migration from the pigment layer of the retina permits a clear view of the choroidal vessels, the pigment epithelium becoming decolorized in the migratory process. The evidences of atrophy of the retina and disk become more pronounced as pigmentation progresses, the disk assuming the characteristic waxy appearance. Retinal degeneration begins in the equatorial region and advances both toward the center and the periphery. These "black spots" may take a rounded or irregular form, closely simulating choroiditis, but their outstanding characteristic is not so much their shape as their position, which must be in the retina, and is recognized from the fact that retinal vessels running by the "black

spots" are covered by them, the spots lying in front of the vessels, i. e., in the inner layers of the retina, while in choroiditis, the vessels are distinctly seen crossing over the pigmented spots.

Förster points out the similarity of the pigmentation in luetic retino-choroiditis and retinitis pigmentosa; however, in the former there are usually associated areas of atrophy (white spots), which do not occur in the latter.

A somewhat similar picture is also occasionally found accompanying certain chronic inflammatory diseases or neoplasms of the liver associated with jaundice, symptoms of hemeralopia, chronic retino-choroiditis with pigmentation closely simulating retinitis pigmentosa being present (*ophthalmia hepatica*).

There are also cases of what are termed *retinitis pigmentosa sine pigmento*, in which the same gradual attenuation of the retinal vessels, progressive optic atrophy, "night blindness," and terminal total loss of vision are noted as in retinitis pigmentosa vera, only that the pigmentary migration is absent. This condition bears points of resemblance to congenital hemeralopia, in so far as in the latter there is night blindness without pigmentation, a further point of resemblance being the element of heredity. The distinction, however, lies in the fact that in the latter there is no retinal nor optic atrophy and vision usually remains good throughout life, the process being a stationary one instead of slowly but surely progressive, as is the case in retinitis pigmentosa.

Gayert and Mettleship describe an allied affection which they term *retinitis punctata albescens* which agrees in all respects with retinitis pigmentosa excepting the pigmentation, the retina being spangled with innumerable small white dots, uniformly distributed over the entire fundus, and which Leber considers to be identical to druses.

Treatment is of no avail to arrest the slow progress of the disease. Mercurials, potassium iodide, strychnine, and general tonic measures, supplemented by the constant current, diaphoresis, etc., may be employed, more to encourage and satisfy the patient, in fact, than for any hope of permanent relief. Temporary improvement may be and is obtained, but it is only transient. A hopeless prognosis need not be given these patients, considering the extreme slowness of progression, they frequently retaining adequate vision for years by means of properly fitted lenses, changed from time to time as required. Should a cortical cataract develop, removal will often give quite satisfactory results.

The following case report is of a patient at present under treatment in the naval hospital, Mare Island, Calif., and the optical condition was picked up during routine examination; however, upon

questioning, the characteristic symptoms were elicited. The personal history of this individual is so characteristic and the elements of consanguinity and heredity so marked, that a brief résumé can not but be of interest.

CASE REPORT

J. A. P., V. B. P. Age, 56. Admitted complaining of "night blindness" and fainting attacks, dizziness and pain in lumbar region.

Family history.—Father and mother were third cousins; maternal grandparents were second cousins; maternal great-grandparents were the same re-

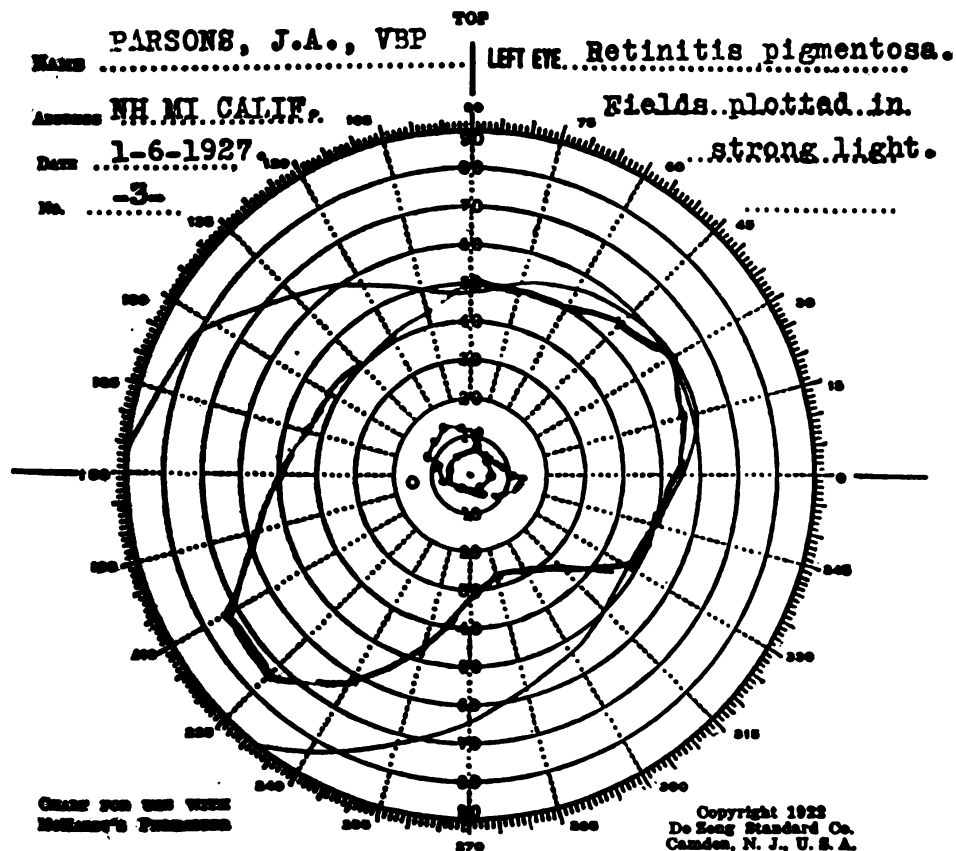


FIG. 1

lationship. Paternal great-grandparents were third cousins and grandparents were second cousins. Maternal uncle blind at 55, typical history of retinitis pigmentosa; mother at present "sees with difficulty." Father died, aged 50, vision failing; only brother has fair vision at 49. Married, no issue.

Personal history.—Usual diseases of childhood. Gonorrhea in 1903; pneumonia in 1923; influenza in 1926; fractured rib in 1914; all teeth extracted in 1925 (latter advised with the hope of restoring vision), glasses fitted, no permanent improvement. No history of lues. Kahn test negative. Urine normal, prostate moderately hypertrophied. Has noticed progressive deterioration of visual acuity since 1917, becoming much worse in past two years, with difficulty in reading by artificial light and progressive hemeralopia. Has had

frequent refractions with no permanent relief. Finds that at present he can not operate his car after nightfall, and his permit has been limited to day driving only.

Physical examination.—Weight, 149 pounds; height, 58½ inches; visual acuity, O. D. 6/20; O. S. 12/20. Muscles normal; consensual reaction normal.

Refraction:

O. D. plus 0.25 plus 0.37 axis 30 }
 O. S. plus 0.37 axis 150 } 20/30.
 Add plus 2.50 spheres O. U.

Ophthalmoscopic examination.—Reveals a typical picture of retinitis pigmentosa. Visual fields plotted for white, red, and green; unable to see the blue

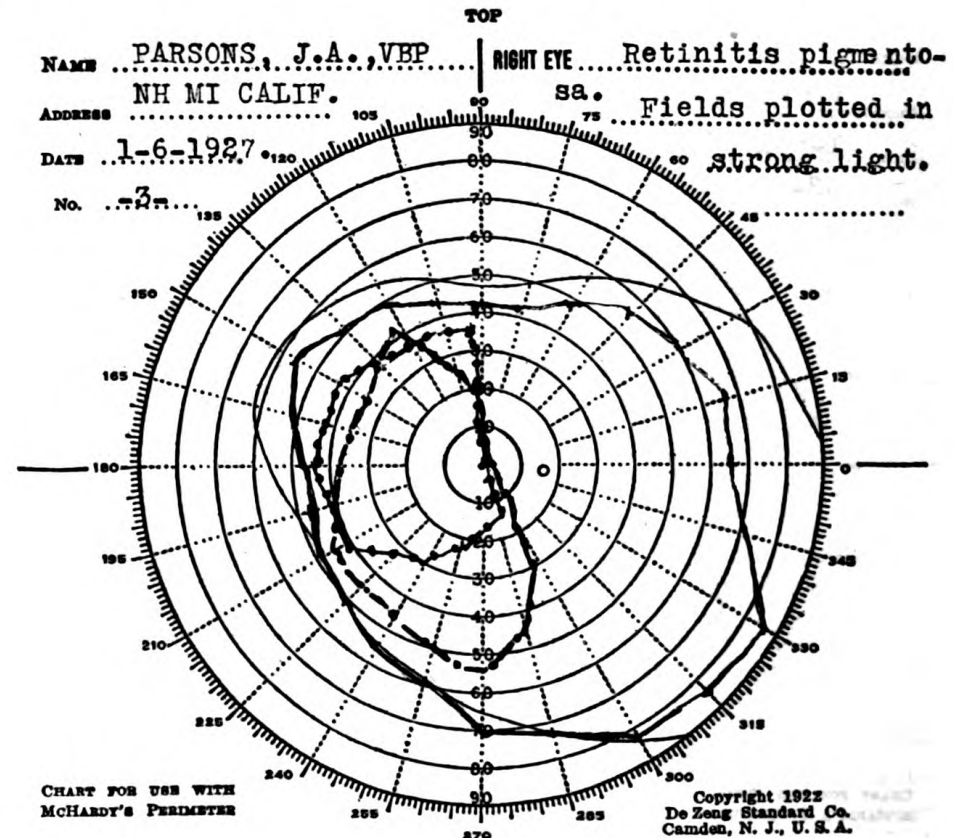


FIG. 2

at any position. No evidence of cataractous development in either eye. Nose and throat normal; no teeth, wearing plates. Heart free from murmurs; lungs normal. Blood pressure $\frac{132}{82}$ S/D. Abdomen and extremities normal; reflexes normal.

It will be noted that aside from the ocular condition this patient is comparatively normal and in good health. The rather remarkable history of intermarriages and family ocular disturbances tend to bear out the belief that this disease is unquestionably one in which heredity plays an essential part, especially so in the case under discussion, and in view thereof, it is deemed of sufficient interest to be presented.

Due acknowledgement and grateful appreciation is hereby extended to Lieut. Commander B. P. Davis, M. C., United States Navy, for his valuable assistance in working up the case history herein reported.

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PREMATURE CONTRACTIONS OF THE HEART

REVIEW OF 100 CASES

By E. C. WHITE, Captain, Medical Corps, United States Navy

This paper is primarily a review of 100 cases in which premature contractions, or extrasystoles, were observed at the United States Naval Hospital, San Diego, Calif. They were taken consecutively, as they appeared for electrocardiograph or general heart examination, some being hospital patients and some being out-patients. The review is from the point of view of the classification of the premature contractions in accordance with their point of origin in the heart, as determined by the electrocardiogram. Its object is to determine what, if any, significance this point of origin may have.

THE MECHANISM OF PREMATURE CONTRACTION

The normal heart contraction is due to an excitation wave which originates in the sino-auricular node, passes downward through the neuro-muscular tissue of the auricle to the auriculoventricular node, through the node and the right and left branches of the bundle of His, to the terminal network of Purkinje in the muscle of the ventricles. As Ferguson and O'Connell have noted, Einthoven recently pointed out that the excitation wave is identical in time, amplitude, and duration with the mechanical activity of the heart muscle, instead of preceding it, as formerly taught.

From the genetic tissue in any part of this pathway through the heart muscle a premature contraction may be originated under certain conditions of disturbed excitability. These conditions may be present as the result of disease of the heart muscle or may be the result of various reflex causes. The excitable point of origin is known as an ectopic focus and may be located in the auricle, high up or low down, in the node, in the bundle, in either branch of the bundle, in the Purkinje network of either ventricle, or at a point so near the interventricular septum that the electrocardiogram will not furnish any evidence as to whether it is in the right or left ventricle.

The only method of determining the point of origin of the premature contractions is by means of the electrocardiogram.

The strength of the premature contraction is dependent upon the period of rest which the muscle has enjoyed since it last contracted. If the premature contraction occurs late in diastole the beat will be strong, the volume of blood will raise the aortic valve leaflets, and the beat will be detected in the pulse. If the premature contraction occurs early in diastole, however, the beat will be weak, the volume of blood insufficient to raise the aortic leaflets, no pulse will be detected, and no second sound will be heard over the apex. Usually the premature contraction will take the place of a regular one and the pause before the next contraction will be compensatory, as in ventricular and nodal, or only slightly prolonged, as in auricular. If the normal rate is slow enough, however, and the premature contraction occurs at just the proper point in diastole, no interruption of the normal beats will occur. It is then a true extrasystole.

SIGNIFICANCE

Premature contractions may be a symptom of coronary atheroma, of generalized myocarditis, of localized myocarditis due to a focus of streptococcus or syphilitic infection, or of arterial hypertension. They may be due to the invasion of the heart muscle by disease, as scarlet fever, rheumatic fever, or pneumonia. They may be provoked by poisons, as chloroform, digitalis, strophanthus, adrenalin, morphine, nicotine, etc. They are frequent in hyperthyroidism, due to overactivity of the autonomic nervous system. They are frequently associated with organic disease of the gall bladder, less often with disease of the stomach, intestines, kidney, and lungs. They are frequently due to reflex irritation through the autonomic and sympathetic systems by coffee, tea, or tobacco. And finally, they are frequent in neurotic individuals in whom no reflex or direct causes can be found.

The general statement is made by Mackenzie and others that premature contractions in themselves are not of serious import; that if heart disease is present there will be other associated symptoms. This statement is subject to qualification, however, for premature contractions may be the first heart symptom to appear. They may be the harbingers of an arterial hypertension or a myocarditis. Furthermore, a premature contraction is wasted cardiac effort. In its execution almost as much heart-muscle energy is expended as in a normal contraction; and the result, as measured in output of blood, is very poor, there often being none whatever. If frequently repeated there will often be a considerable falling off in the total

blood flow. Thus the heart will be one whose net efficiency is below normal when measured by comparison of energy expended with resultant work.

SYMPTOMS

There are two groups—those that have and those that have not symptoms. Very often the premature contractions are first discovered during a routine physical examination.

Neurotic symptoms may be induced in these patients by the physician informing them of the condition. Or the patient may come to the physician complaining that his heart is "missing." Or disagreeable thumping, due to the compensatory beat following the premature contraction, may be the most prominent symptom. Other patients complain of surging, wavelike sensations under the upper sternum or at the root or in the muscles of the neck. Sometimes the premature contractions are felt as painful, sudden stabs, or spasms, or sensations as of twisting the heart. In other cases there is slight dizziness, synchronous with the pause following the premature contraction. Or there is a momentary apprehension or faintness at this time. Rarely, symptoms resembling attacks of angina pectoris may be present, including the radiating pains to shoulder and elbow, and fear of death. If premature contractions are numerous, there may be a constant feeling of uneasiness or soreness of the precordium. This area is sometimes tender. Symptoms may be present night and day, the patient being awakened by them. This is more common, however, when there is a series of premature contractions, which then become a true attack of paroxysmal tachycardia. If they are abolished or diminished by exercise they are more likely to be benign. If increased in frequency by exercise they are usually due to myocardial changes. If the patient is neurotic, he will be constantly taking his pulse, fearful of any exertion that may strain his heart, and will be morbid and depressed.

PROGNOSIS

Prognosis will depend upon the cause and upon how long the premature contractions have been present. If the cause can be corrected and the premature contractions have not been present over a long period of time, the prognosis for cure is very favorable. If no cause can be ascertained and they have been present for a long time they will probably persist, but in themselves they will cause little or no damage to the heart muscle.

TREATMENT

The treatment is to remove the cause if one can be found or to treat the associated cardiac or extracardiac disease.

The use of tobacco and tea and coffee should be interdicted until it is determined that abstention does not affect the premature contractions. The condition of the gastrointestinal tract should be investigated. Overwork or excessive fatigue should be corrected or moderate exercise prescribed for the sedentary.

So far as drugs are concerned, a great variety has been used with varying results. Atropine is sometimes effective, though its effect is apt to be temporary. Digitalis should be tried experimentally. Theoretically it is contraindicated, but practically it is often useful when administered in small daily doses. Otto and Gold, in a clinical study without regard to the type of premature contraction, found that atropine and rest in bed had no effect on their number; exercise and epinephrin increased the number and quinine, quinidine, and digitalis decreased in number.

Classification of 100 cases

"A." With no heart pathology:

1. Auricular.....	24
2. Ventricular (right, 9; left, 9; both "R" and "L," 3).....	21
3. Nodal.....	8
4. Nodal and "R" ventricular.....	1
5. "L" ventricular and occasional auricular.....	1
Total.....	55

"B." With heart pathology:

1. Auricular.....	6
2. Ventricular ("R," 13; "L," 15; both "R" and "L," 2).....	30
3. Sinus and "R" ventricular.....	1
4. Auricular and ventricular.....	3
5. Auricular and nodal.....	2
6. Nodal and "R" ventricular.....	3
Total.....	45

DISCUSSION

Of the 30 cases with premature contractions originating from a single focus in the auricle, 24 showed no evidence of heart pathology, while 6 did. Of the 6 with pathology, 1 had a compensated mitral stenosis, 1 an occasional paroxysmal tachycardia, 1 a pericarditis with effusion, while the other 3 were classed as myocarditis but not severe. In other words, in no one case were premature contractions arising from a focus in the auricle associated with a serious heart condition. Of the 24 with no heart pathology, 14 were in elderly men with no evidence of diminished cardiac reserve. The others had various associated conditions, as thyroid adenoma, or chronic bronchitis, or occurred in young people with no determinable foci of disease.

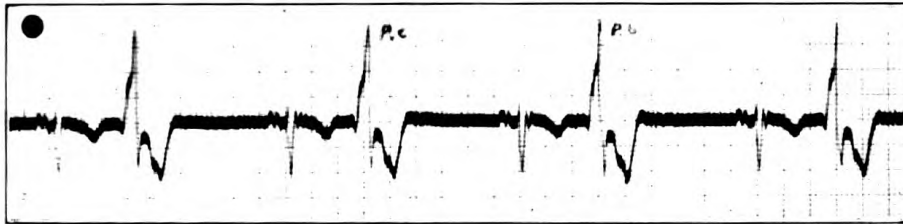


FIG. 1.—RIGHT VENTRICULAR PREMATURE CONTRACTIONS, ALTERNATING TYPE. (USUALLY BENIGN WHEN REGULAR AFTER EVERY OTHER NORMAL BEAT—PARDEE.) LEAD III-A. J.—ARTERIOSCLEROTIC MYOCARDITIS

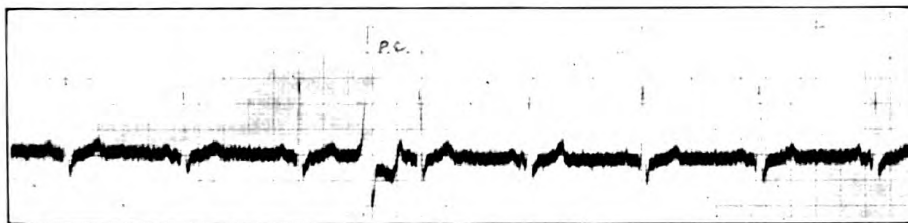


FIG. 2.—INTERPOLATED PREMATURE VENTRICULAR CONTRACTIONS. NO INTERRUPTION OF THE REGULAR HEART BEATS. LEAD I-C. M., 89 YEARS OLD

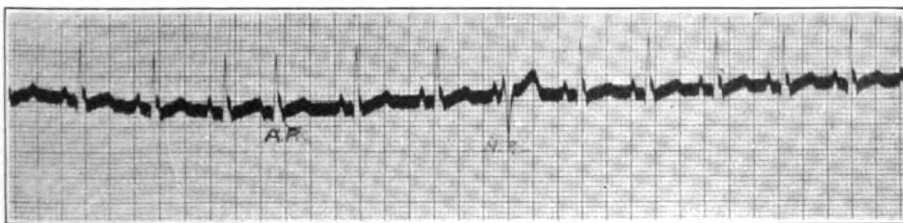


FIG. 3.—AURICULAR AND NODAL PREMATURE CONTRACTIONS. LEAD I-W. P., 78 YEARS OLD. ARTERIOSCLEROTIC MYOCARDITIS

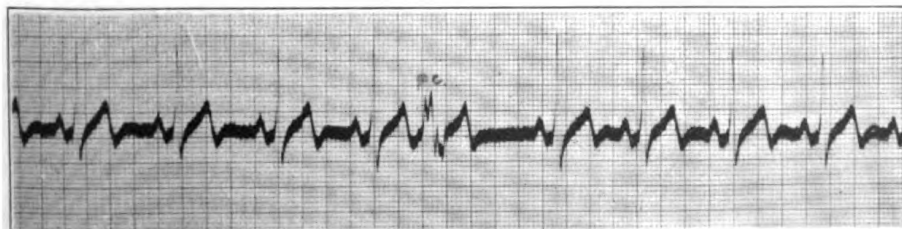


FIG. 4.—NODAL PREMATURE CONTRACTIONS. LEAD II-G E. M. NO DISEASE

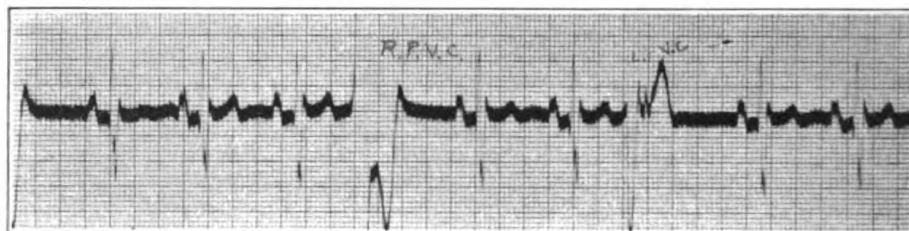


FIG. 5.—RIGHT AND LEFT PREMATURE VENTRICULAR CONTRACTIONS HAVE BEEN PRESENT FOR 40 YEARS. LEAD III-C. W. V., 76 YEARS OLD. NO DISEASE

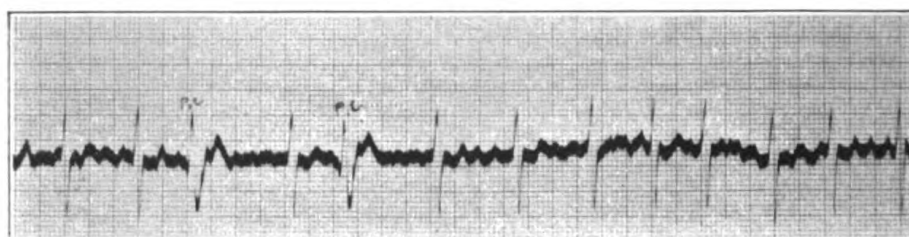


FIG. 6.—LEFT VENTRICULAR PREMATURE CONTRACTIONS, WITH AURICULAR FIBRILLATION. T. J. C. CARDIAC DECOMPENSATION, DOUBLE MITRAL LESION

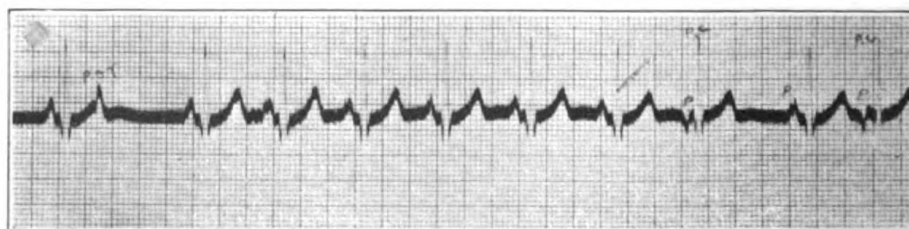


FIG. 7.—PREMATURE AURICULAR CONTRACTIONS, AT INTERVALS BLOCKED AT THE AURICULO-VENTRICULAR NODE BECAUSE TOO EARLY IN DIASTOLE. PATIENT NOT CONSCIOUS OF IRREGULARITY

570-2

Of the 51 cases with premature contractions originating only from foci in the ventricles, 21 showed no evidence of heart pathology, while 30 did. Of the 30 with pathology, 7 had fibrillating auricles, 3 had mitral valve lesions with decompensated hearts, 2 had bundle branch blocks, 2 had adhesive pericarditis of long standing with low cardiac reserve, and the others had a myocarditis, 8 being noted as severe. Of the 21 with no heart pathology, 2 had gynecological conditions, 2 had gall stones. In 2 cases they ceased when the patients stopped smoking. In 8 cases no cause was found. One epileptic had left ventricular premature contractions alternating with normal contractions during the entire time. In one case they appeared following the post-operative collapse of the lower lobe of the right lung, with consequent marked displacement of the heart to the right. As the lung expanded and the heart moved back to its normal position the premature contractions disappeared. In seven cases associated conditions of minor importance were noted; as peridental or tonsil infections, chronic colitis, catarrhal jaundice, etc.

Of the eight cases with premature contractions originating only from foci in the auriculo-ventricular node, none showed evidence of heart pathology.

As a rule, in the cases where premature contractions were recorded as originating from more than one focus, a serious myocarditis or other heart lesion was present. Among the exceptions to this rule was one case with a recurrent duodenal ulcer who had numerous left ventricular with occasional auricular premature contractions. As he improved on a modified Sippy diet, all premature contractions disappeared. Another case with numerous premature contractions, both right and left ventricular, was a man 76 years of age with a history of having had the condition for 40 years. Careful examination failed to disclose any other evidence of heart disease. These were exceptions, however.

One case with premature contractions arising from various foci in both right and left ventricles was fibrillating most of the time while under observation. Another, in which at times right alternated with left ventricular to the complete exclusion of all normal contractions, died a few months later of myocardial failure. The only case in which true sino-auricular premature contractions were recorded also had right ventricular premature contractions, and was a case of progressive myocarditis with rapidly diminishing cardiac reserve.

Of the mixed auricular and ventricular premature contractions, one had a coronary atheroma, one a bundle-branch block with arteriosclerotic myocarditis, and one occasional attacks of ventricular paroxysmal tachycardia with serious subjective symptoms.

Of the mixed auricular and nodal premature contractions one had frequent attacks of paroxysmal tachycardia, with myocarditis and marked diminution of cardiac reserve, and the other had had several attacks of angina pectoris.

Of the mixed nodal and ventricular premature contractions, one had a coronary atheroma with bundle-branch block, one an arteriosclerotic myocarditis, one a myocarditis associated with tuberculosis of the lungs. One had no other heart symptoms, and the premature contractions disappeared when an associated gastric ulcer improved under treatment.

SUMMARY

1. Of 100 cases with premature contractions, 45 per cent were in cases with definite heart pathology and 55 per cent in cases with no heart pathology.

2. Of the 100 cases, 30 per cent showed auricular premature contractions only, 51 per cent ventricular, 8 per cent nodal, and 11 per cent multiple foci.

3. Of the 30 per cent auricular, 24, or 80 per cent, were not associated with cardiac pathology; while in the other 6, or 20 per cent, the pathology was not of a serious nature.

4. Of the 51 per cent ventricular, 21, or 41 per cent, were not associated with cardiac pathology, while 30, or 59 per cent, were associated with pathology of more or less serious nature.

5. Of the 8 per cent nodal, none was associated with cardiac pathology.

6. Of the 11 per cent multiple foci, 9, or 82 per cent, were associated with cardiac pathology.

CONCLUSIONS

1. Premature contractions originating from foci in the ventricles are very much more likely to be associated with definite heart pathology than are premature contractions originating from foci above the ventricles. If they originate from multiple foci, this association with pathology is still more marked.

2. A patient with premature contractions that persist after corrective measures have been applied to any associated disease or errors in habit should be carefully investigated by means of the electrocardiograph to determine the location of the focus, or foci, from which the premature contractions originate. If the location is in the auricles or node, the premature contractions are probably benign. If in the ventricles, or there are multiple foci, they may be benign, or may be the first symptoms of organic changes in the myocardium;

and a more careful prognosis is warranted. This is particularly true in subjects who are past 50 years of age with premature contractions of recent development.

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RÖNTGEN RAY EXAMINATION IN SUSPECTED CHRONIC APPENDICITIS*

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The clinician is confronted daily with the problem of determining how much weight must be given to gastric complaints. Practically every patient has a history of stomach upsets, heartburn, heavy feeling, gas, belching, or other indefinite symptoms. This is especially true in a hospital such as this where the greater proportion of patients have neurotic tendencies or disorders. While the history is an important part of the examination, nevertheless, too much credence can not be placed in it. Frequently one is forced to disprove rather than prove many statements and the Röntgenologist is called upon to help in this process of elimination.

It is well to remember, as W. J. Mayo has pointed out, that about one patient out of ten with gastric symptoms has gastric pathology. A review of the cases coming through the X-ray department here seems to substantiate this statement. The majority of our patients have had rather vague and indefinite symptoms. In this type the appendix seems to have been the most commonly suspected source of trouble. It was a desire to find out just how much reliance could be placed upon our X-ray diagnosis of chronic appendicitis that prompted investigation of this series. A total of 57 cases has been examined by film and screen methods, and findings in these checked against the surgeons' operative reports. In practically every case it has been my good fortune to be present at time of operation. The findings of the surgeon, internist, and laboratory technician have been incorporated with the writer's, and the appended chart is the result of our efforts.

* From U. S. Naval Hospital, Great Lakes, Ill.

The clinical data contained in this chart are gathered from the hospital records, and are as free from bias and enthusiasm as possible. Some of the histories and symptoms will appear indefinite; but as this series is purposely based on histories and reports, rather than personal contact between patient and writer, no effort to obtain further data was made.

Much has been written and numerous signs advanced by röntgenologists in order to give a more definite plate or screen picture of chronic appendicitis. It is the writer's opinion that such signs as spasticity of the colon, stasis of the terminal ileum, patency of the ileo-cecal valve, etc., are seen so often in cases in which no appendix involvement is suspected that they can not be given much importance, as direct signs, in attaching pathology to this highly maligned organ.

The appendix examination is conducted as part of the routine gastro-intestinal series. The patients are fluoroscoped at 6, 24, 48, 72, and 96 hour intervals, and films taken. A visible appendix at the 24-hour examination is not considered abnormal. If at the 48-hour and later examinations, the appendix is visible, it is believed this is a sign of delay in emptying and is suggestive of pathology. However, it is not thought that delay in emptying alone is a sign of a chronically inflamed appendix.

On the other hand, a visible appendix with definite tenderness at the 24-hour and succeeding examinations is considered a valuable sign and one which, with clinical evidence, should warrant the diagnosis of chronic appendicitis. I believe that tenderness, constant and definite, over the appendiceal shadow is the only positive sign Röntgenologists should consider as a logical basis for making this diagnosis without reservations.

Forty-five patients showed a visible appendix and 12 did not:

Table I

Appendix visible.....	45
Appendix not visible.....	12
Total.....	57

This is approximately 79 per cent for this series. Of this number, 39 had tenderness over the appendix shadow and 6 failed to show evidence on palpation and manipulation.

Table II

Tenderness over appendix area.....	39
No tenderness over appendix area.....	6

The surgeon's reports show that there were gross pathological changes found at operation in 47 cases, or 82.6 per cent.

Table III

Pathology grossly seen around appendix.....	47
No pathological changes.....	7
Doubtful.....	3
Total.....	57

Seven had no gross pathological changes and three have been classified as doubtful because the description of findings is not specific enough on the operative reports, and the writer does not feel justified in considering them under positive findings.

Thus it is seen that of the 45 with visible appendices, 39 had definite tenderness. This leaves 6 patients in whom the tenderness was absent or in whom it was considered that the tenderness was either too slight or was exaggerated to such an extent that it was not believed to be due to definite appendiceal involvement.

At this point it is well to refer to the question of the location of the appendix. Experience shows that a visible appendix is not always found at McBurney's point; in fact, it is most often found away from this location. The visualization of a suspected chronic appendix and its localization is of value to the internist and surgeon. It often happens that a patient with vague symptoms will have physical findings which are suggestive of sources other than the appendix. If one can definitely attach these physical findings to this organ, one has aided materially in clearing up the diagnosis.

Two cases in this group bring this point out rather strikingly. In one, the tip of the appendix was found attached to the under surface of the liver near the gall bladder. In the other the shadow was seen high up under the right costal arch and was palpated with difficulty. There was tenderness on palpation. At operation a kinked appendix was found corresponding to the location noted at screen examination and confirmed by the films. In both instances the tenderness was never found in the stereotyped location.

It is well to remember while dealing with tenderness that the examiner must feel certain this tenderness is definitely localized over the visible appendix. It has been my observation that many patients show tenderness over the upper portion of the cecum and ascending colon. This seems especially true in the enteroptotic and redundant colon types. These people seem to have a retardation of the passage of the meal from this location. The barium, after 48 hours, appears frothy, and even in the 96-hour film a fine coating may be present. In many of this type pressure over an appendix that happens to be filled, and is free from the cecum, will not show tenderness. However, if one palpates along the cecum, ascending colon, and looping, which is usually present at the hepatic flexure, one will find the

patient complaining of pain. This pain, however, is not thought to be due to a chronically inflamed appendix, but is most likely due to inflammatory changes in the bowel proper caused possibly by stasis.

It is my opinion that this is the type of case the röntgenologist is frequently called upon to examine after appendectomy has failed to give relief from symptoms. The more often one examines patients of this character the more firmly one is convinced that many are not benefited by appendectomies. It is believed that if these individuals had had thorough plate and screen examinations made prior to operation, many of them would still retain their appendices. As they now are they have no appendix, but do have the same symptoms and, most likely, added ones, due to the inevitable adhesions which follow surgical interference.

This statement is made not because it is believed appendectomies should not be done. On the contrary, the proximity of an appendix to a low-grade chronic inflammatory process in the colon is a source of danger, and its removal, so far as mortality rates are concerned, is no doubt a beneficial procedure. From a diagnostic standpoint, and especially from relief of symptoms, there remains a strong conviction in my mind that we have been too eager to blame the appendix for all the ills in this region.

While it is believed that definite localized tenderness over the appendix is the most valuable sign, nevertheless, in the presence of a lesion of the duodenum or gall-bladder, this seeming definite tenderness may be misleading. This point is clearly exemplified in a case of this series in which the fluoroscopic examination seemed to point to pathology in the duodenal region. The bulb was smaller than normal, appeared slightly irregular, and was difficult to fill by expression. There was some tenderness in the gall-bladder region, but not over the bulb. On the succeeding examinations the tenderness in the right hypochondrium remained. The patient did not complain of pain in this area so much as he did on palpation of the appendix. At the 96-hour examination the appendix had emptied itself, but the pain on pressure remained. It was believed there was appendiceal involvement, and the patient was asked to return for examination after the administration of belladonna in order to rule out the possibility of reflex duodenal irritation.

However, he was anxious to have something done quickly and did not seem willing to lengthen the observation period. The surgeon felt there was sufficient clinical evidence to warrant an exploratory, and accordingly did so. At operation a long, free, normal-looking appendix was found. The duodenum showed a small ulcer on the anterior surface just beyond the pyloric ring. Observers warn us of the possibility of duodenal changes due to reflex spasm caused by

diseased condition outside the bulb. In this instance the reverse seemed true. There was no evidence, macroscopically, of an appendix involvement, although the tenderness on palpation was more marked and more definitely localized over the appendix area than it was over the bulb region. The pathological report on this appendix showed signs of chronic inflammatory changes.

Thus far only the visible appendices have been discussed. Twelve cases, or 21 per cent, in this group failed to show a visible appendix. In this type we have no direct signs. It is necessary to enter the realm of inference with its increased liability of error. It has always seemed more reasonable to believe that a chronically inflamed appendix would be seen less often than a normal one. Recurrent attacks should have a tendency to obliterate the lumen and prevent entrance of the barium. In this small number of cases this seems to have been true.

Table IV

Nonvisible appendices with gross pathological changes.....	12
Nonvisible appendices with no gross pathological changes.....	0

In every case the surgeon's report showed evidence of gross pathological changes, and, to my observation, these changes were more marked than in the visible ones showing macroscopical evidence of disease. The fact that the appendix is not visible at any time during this 96-hour period is, it is believed, good evidence that its lumen is obstructed. On palpation one has to be guided by the position of the base of the cecum. If, in addition to failure to visualize the appendix, tenderness on pressure is found, in the region where the appendix most often is, there is an added reason for inferring that the organ is diseased. Table V shows that only 50 per cent of these cases had definite tenderness.

Table V

Tenderness base of cecum.....	6
No tenderness base of cecum.....	6

It is to be regretted that pathological sections were not obtained on every case, or the records of its having been done can not be found. Only 40 cases have had microscopical examinations, and in 39 the reports show some evidence of chronic changes. This has varied from slight inflammatory changes to those in which obliterative findings were recorded. It is realized that the pathological findings in chronic appendicitis are subject to much discussion and doubt, and it is not believed the slight microscopic changes noted in some cases could account for tenderness on pressure found at screen examination.

The clinical histories will not be gone into in detail. Table VI gives an idea of the symptoms found.

Table VI

Pain in right lower quadrant.....	38
Epigastric pain.....	21
Recurrent attacks of pain.....	19
Nausea.....	19
Vomiting.....	18
No nausea.....	27
No vomiting.....	28
Eruclation of gas.....	12
Constipation.....	14
Diarrhoea.....	3

This table is not so complete as it might be because the same line of questioning and history taking was not followed in each case. As a result, the data contained therein are not believed to be of much value in analyzing the clinical symptoms.

In Table VII are given the other pathological conditions found at operation:

Table VII

Ulcers of duodenum.....	4
Adhesions about gall-bladder.....	3
Cholecystitis, chronic.....	1

This leads up to the real value of plate and screen examination in suspected cases of chronic appendicitis. While it is thought definite localized tenderness over a visible appendix is the only reliable sign, this series seems to show that it was possible to suspect the presence of chronic appendicitis in approximately 79 per cent. Nevertheless, it is not claimed that the Röntgen diagnosis is per se the valuable object desired. The principal value of these tests is found in the fact that the internist and surgeon are furnished valuable information concerning the function and appearance of the stomach and duodenum. The gall bladder in the past has shown positive signs of disease rather infrequently, but with the advent of the tetraiodophenolphthalein visualization method of Graham, combined with the indirect findings obtained during screen examination, it is believed our studies of these abdominal organs are becoming more exact. Although it is not possible in every case absolutely to rule out pathological conditions, in the majority of instances it is possible to detect changes which, by their early recognition, will at least give the surgeon a fair chance for successful intervention.

It is thought many of the failures to obtain relief from symptoms following appendectomies are due to the fact that sources other than the appendix have not been carefully ruled out. When the patient leaves the hospital and returns to his ordinary routine of life, and especially to his dietetic errors, the old complaints return. With them he has a realization that a failure in diagnosis in his case has

been made. This engenders a feeling of antagonism toward further observation into his condition, and, unconsciously perhaps, creates a spirit of scepticism toward the medical profession as a whole. Everyone looks forward to the day when a correct diagnosis can be made in every case. At present it is realized this is an impossibility, and even the most scientific procedures fail to show the etiology of many conditions. Nevertheless, it is likewise true that a complete search for all possible sources of trouble with the application of present-day methods will prevent many unnecessary appendectomies, or show the necessity for early surgical intervention at other diseased locations.

CASE REPORTS

No.	Symptoms	Laboratory findings	X-ray findings	Surgical findings
1	Pain in lower half of abdomen; tenderness, R. L. Q.; no nausea or vomiting.	W. B. C.—6,200.....	Appendix with kinking; appendix constricted at base; no localized tenderness over appendix area.	Enlarged chronic appendix with constriction at base and tip; fecalith in tip.
2	Poor appetite; epigastric pain; eructation of gas; no nausea or vomiting.	W. B. C.—7,450..... N-62 L-35 T-1 E-2 Gastric analysis: Free, 55; combined, 80. Occult blood negative.	Appendix with constriction at base; no definite tenderness.	Chronically inflamed appendix, enlarged and enclosed near base; healed non-perforating ulcer of duodenum.
3	Vague gastric symptoms; history of 3 severe attacks; poor appetite; nausea and vomiting.	W. B. C.—7,700..... N-67 L-31 M-1 T-1 E-2	Appendix not visible; marked tenderness on pressure in region of base of cecum.	Appendix bound down in pelvis and showed what appeared to be a perforation at tip (many adhesions about gall bladder).
4	Epigastric pain; tenderness, R. L. Q.; constipation; no nausea or vomiting.	W. B. C.—7,900..... N-68 L-32 M-8 E-2	Long appendix with localized tenderness on pressure over appendiceal shadow.	Long chronically inflamed appendix; appendix thickened.
5	Gas on stomach about 1 hour after eating; jaundice 5 years ago; pain and tenderness, R. upper and lower quadrants; no nausea or vomiting.	Gastric analysis: Free HCl, 20; total, 30. W. B. C.—..... N-68 L-28 M-2 E-2	Long kinked appendix with constriction at base.	Chronic appendix with short meso; immobilizing cecum (gall bladder thickened, grayish white, and covered with many blood vessels).
6	Vague gastric symptoms; pain and tenderness in R. L. Q.; no nausea or vomiting.	Gastric analysis: Free, 32.5; total, 45. W. B. C.—8,450..... N-64 L-31 M-3 E-2	Long curved appendix with tenderness definitely localized over shadow.	Appendix bound down by adhesions, immobilizing cecum.
7	Constipation; pain and tenderness for months in R. L. Q.; severity of symptoms increasing; no nausea or vomiting.	W. B. C.—11,300..... N-65 L-30 M-3 E-1	No appendix seen; tenderness base of cecum.	Large funnel-shaped appendix.
8	Periodic attacks of pain and tenderness in R. L. Q.; no nausea or vomiting.	W. B. C.—5,350..... N-62 L-32 M-5 E-1	Long appendix with dilated tip; marked tenderness definitely localized over shadow.	Distal half of appendix congested; wall thickened; filled with fecal matter.
9	History of frequent gastric upsets with attacks of nausea and vomiting; pain and tenderness in R. L. Q.	W. B. C.—6,950..... N-64 L-36 M-10	Long appendix seen; marked tenderness over appendiceal shadow and base of cecum.	Long appendix containing fecalith; base of cecum adherent to lateral abdominal wall.
10	Discomfort 15 minutes after eating; pain and tenderness in R. L. Q.; no nausea or vomiting.	W. B. C.—6,950..... N-64 L-36 M-10	Kinked appendix with dilated tip seen at base of cecum; tenderness definitely localized over appendix shadow.	Appendix long and showed signs of chronic inflammation.

11	Discomfort after eating; constipation; pain and tenderness in right iliac region; history of nausea and vomiting.	W. B. C.—6,700. Gastric analysis: Free, 68; total, 106. Blood negative. W. B. C.—7,700.	N-65 L-32 E-1 E-2	No appendix seen; cecum fixed; tenderness over base of cecum.	Appendix filled with fecal concretions and bound down in right iliac fossa.
12	Constipation; indefinite gastric symptoms; slight pain and tenderness; no nausea or vomiting.	W. B. C.—7,700.	N-63 L-36 M-2	No appendix seen; no tenderness in region of base of cecum.	Chronic appendix bound down with adhesions.
13	History of pain and tenderness in R. L. Q. for three years; no nausea or vomiting.	Leucocytosis during attacks; normal count during interval.	N-63 L-36 M-2	Short appendix curved under base of cecum; tenderness definitely localized over shadow.	Atrophic appendix with scars and adhesions about ileocecal valve.
14	Recurrent attacks of pain in R. L. Q. for 3 years; vomiting during attacks.	W. B. C.—9,150.	N-65 L-27 M-5 E-3	No appendix seen; marked tenderness around base of cecum.	Long, kinked appendix bound down in iliac fossa.
15	Indefinite gastric symptoms; pain and tenderness in R. L. Q.; no history of nausea or vomiting.	W. B. C.—7,750.	N-65 L-27 M-5 E-3	Large curved appendix with adherent tip; definite tenderness over appendiceal shadow.	Long, kinked, chronically inflamed appendix; some infection in head of cecum.
16	History of recurrent attacks of pain and tenderness in R. L. Q. accompanied by nausea but no vomiting.	W. B. C.—8,250.	N-63 L-41 M-2 E-3 E-2	Medium sized appendix at base of cecum with definite tenderness over shadow.	Kinked appendix bound down in pelvis.
17	Indefinite abdominal pain. History of nausea and vomiting.	W. B. C.—7,650.	N-63 L-34 M-2 E-1	Long appendix with tip reaching brim of pelvis; definite tenderness over appendiceal shadow.	Appendix bound down in its middle third; tip large and contains fecalith the size of a pea.
18	History of recurrent attacks of pain in R. L. Q. No nausea or vomiting. No tenderness.	Gastric analysis: Free HCl 9.5; total 24. Blood negative. W. B. C.—8,950.	N-69 L-38 M-2 E-1	Long appendix, kinked in middle third; no definite tenderness on pressure over appendiceal shadow.	Appendix bound down on mesentery of ileum; band of adhesions constricting appendix in its middle third.
19	Pain in R. L. Q. when constipated. Nausea and vomiting after eating.	W. B. C.—6,950.	N-67 L-43	Long appendix seen; tip appeared fixed toward midline; tenderness over appendiceal shadow.	Appendix enlarged and showed signs of chronic inflammation.
20	Sour stomach. Eructation of gas. Constipation. Recurrent attacks of pain and tenderness R. L. Q. and G. B. region. Occasional nausea and vomiting.	Occult blood negative. W. B. C.—6,250.	N-66 L-32 M-1	Long appendix running upward along inner border of cecum; tenderness along shadow; tip thickened.	Post cecal appendix; tip extending up to undersurface of liver.
21	History of severe attacks of pain in R. L. Q. Later attacks accompanied by nausea and vomiting. Constipated.	W. B. C.—6,837.	N-65 L-35	No appendix seen; tenderness on pressure over base of cecum.	Large free appendix; distal one-third acutely inflamed.
22	History of constipation and pain in R. L. Q. No nausea or vomiting.	W. B. C.—6,750.	N-49 L-48 E-3	Long appendix with constriction; tenderness on pressure along appendiceal shadow.	Appendix long and contained several fecaliths.
23	History of pain and tenderness in R. L. Q. No nausea and vomiting. Had attack of amoebic dysentery.	W. B. C.—7,250.	N-60 L-40	A large abnormal looking appendix seen; constrictions at base; no definite localized tenderness.	Fairly long appendix with adhesions at its base; vill-like membrane over large bowel.
24	Pain and tenderness in R. L. Q. with indefinite gastric symptoms. No nausea or vomiting.			No appendix seen; no tenderness in region of base of cecum.	Long appendix firmly bound down in iliac fossa; two areas of constriction, middle third of appendix; vill-like membrane over ascending colon.

CASE REPORTS—Continued

No.	Symptoms	Laboratory findings	X-ray findings	Surgical findings
25	History of epigastric pain; eructation of gas; vomiting after meals; constipation.	W. B. C.—11,700 L-21 M-4	Long appendix with curled tip; tenderness localized over appendiceal shadow.	Long free appendix; adhesions about gall-bladder.
26	Pain in right side of abdomen; no nausea; tenderness in appendiceal region.	W. B. C.—7,800 N-67 L-33	Small appendix seen; tenderness on pressure over base of cecum and appendiceal shadow.	Long tortuous appendix filled with concretions; firm bands of adhesions from anterior surface of ascending colon to lateral abdominal wall immobilizing that part of the gut.
27	Pain in epigastric region and R. L. Q.; no relation to taking food; no nausea or vomiting; constipation.	W. B. C. N-59 L-35 M-6 Gastric analysis: Combined, 33; total 45. Blood negative. W. B. C.—8,400	Appendix seen at inner side base of cecum; tip dilated; constant tenderness over this shadow.	Appendix long, curled on itself, and filled with fecaliths; appendix definitely diseased.
28	Pain and discomfort in epigastric region; tenderness on deep pressure in R. L. Q.; eructation of gas; nausea and vomiting.	N-71 L-27 T-1 E-1 W. B. C.—8,250	Appendix long; definite tenderness over appendiceal shadow.	Large bulbous appendix with some kinking in mid portion; great omentum down over ascending colon into right flank, constricting and immobilizing mid portion of ascending colon.
29	History of stomach trouble for 5 years; pain in R. L. Q. accompanied by attacks of nausea and vomiting	N-55 L-41 M-1 E-1 W. B. C.—6,700	Long appendix extending down over right sacro-iliac articulation; definite tenderness over appendiceal shadow.	Long appendix firmly bound down on mesentery of terminal ileum; kinked; cecum adherent to lateral abdominal wall.
30	Eructation of gas; pain and tenderness in R. L. Q.; nausea but no vomiting; had amoebic dysentery.	N-56 L-43 M-1 W. B. C.—9,300	Appendix with constrictions; tenderness over shadow; more kinked toward base.	Short thick appendix firmly bound down in right iliac fossa; kinked at tip.
31	Two months previous had attack of pain in R. L. Q. accompanied by nausea and vomiting; second attack 2 weeks ago.	N-86 L-7 T-4 E-3 W. B. C.—6,450	No appendix seen; no tenderness in region base of cecum.	Long appendix, injected and bound down.
32	History of eructation of gas; nausea and pain in R. L. Q. for 7 years; attacks occur at 2-3 months' intervals.	N-67 L-31 E-2 W. B. C.—9,800	Long appendix, fishhook in type, extending toward mid line and adherent toward tip; tenderness not marked over appendiceal shadow.	Long appendix, firmly adherent low down on mesentery of ileum. Acutely kinked near its mid portion; distal one-third considerably injected.
33	Pain and tenderness in R. L. Q.; no history of nausea or vomiting; has had amoebic dysentery.	N-70 L-24 M-4 E-2 N-58 L-38 M-2 E-2 W. B. C.—7,100	No appendix seen; no tenderness over appendix area.	Very large appendix. Kinked. Marked injection of blood vessels. Head of cecum injected and unusually adherent.
34	Pain in R. L. Q.; no history of nausea or vomiting.		Appendix filled at 72 hours; tenderness over appendix especially near tip.	Long free appendix filled with hard fecal matter.

35	Recurrent attacks of severe pain in R. L. Q.; no nausea or vomiting.	W. B. C.—7,600.....	N-75 L-24 E-1	Visible appendix with definite tenderness over shadow.	Appendix short thick type, bound down to iliac mesentery at tip by firm adhesions of scar tissue. Definite evidence of previous disease.
36	Pain and discomfort in abdomen accompanied by attacks of diarrhea; no nausea or vomiting.	W. B. C.—10,750.....	N-45 L-52 M-1	Appendix visible under costal arch; tenderness over shadow at 72 hours.	Appendix fixed high up under right costal arch.
37	Pain in R. L. Q.; vague gastric history; eructation of gas; no nausea or vomiting.	W. B. C.—6,675.....	N-62 L-33 B-3 T-1 E-1	Appendix with definite tenderness over shadow visible at 72 hours.	Fairly normal looking appendix, but slightly bound down by adhesions.
38	History of pain and tenderness in R. L. Q.; no nausea or vomiting.	W. B. C.—7,750.....	N-64 L-28 M-3 T-1 E-1	Small thick appendix at base of cecum; tenderness on pressure over this shadow.	Free appendix filled with hard fecal matter.
39	Pain and tenderness in R. L. Q. and epigastric region for several years; constipation; no nausea or vomiting.	W. B. C.—6,950.....	N-70 L-29 T-1	Appendix 2 inches long; tenderness over appendix; shadow at 72 hours.	Short stubby appendix with adhesions about the base.
40	Recurrent attacks of pain in R. L. Q. with nausea and vomiting.	W. B. C.—7,900.....	N-48 L-51 M-1	No appendix shadow seen; no tenderness in appendix area.	Constriction near base of appendix. Tip bound down in iliac fossa. Central portion bulbous.
41	History of epigastric pain; occasional vomiting; slight tenderness.	W. B. C.—7,550.....	N-66 L-34 E-1	No appendiceal shadow seen; abnormal tenderness along outer margin of cecum and ascending colon.	Appendix 7 inches long, bound down, and kinked in mid portion.
42	Vague abdominal complaints; eructation of gas; constipation; tenderness in R. L. Q.	W. B. C.—10,200.....	N-74 L-23 B-2	Visible appendix at 72 hours; constant tenderness definitely localized over appendiceal shadow.	Long, kinked appendix, with adhesions 1 inch from base.
43	Pain in right upper and lower quadrants; tenderness; no nausea or vomiting.	W. B. C.—9,725.....	M-1 N-69 L-30	Appendix visible at 72 hours; tenderness definitely localized over this shadow.	Fairly normal looking free appendix; small ulcer in duodenum.
44	Attacks of abnormal pain; constipation; no nausea or vomiting; eructation of gas.	W. B. C.—9,050.....	N-58 L-36 M-5	Visible appendix at 96 hours; tenderness on deep pressure, definitely localized over appendiceal shadow.	Fairly normal looking appendix macroscopically.
45	Several attacks of acute pain in R. L. Q. for 6 months; tenderness and rigidity in R. L. Q.; nausea and vomiting accompanied each attack.	W. B. C.—7,400.....	E-1 N-64 L-40 M-5 E-1	Small amount of barium in tip of appendix at 96 hours; tenderness definitely localized over appendiceal shadow and base of cecum.	Appendix long and bound down in right iliac fossa with firm band of adhesions in its middle third.
46	Eructation of gas and discomfort after eating; pain in epigastric region; occasional vomiting.	W. B. C.—6,400.....	N-65 L-39 M-4	Long curled appendix visible at 96 hours; definite tenderness over appendiceal shadow.	Adhesions between terminal ileum and cecum, completely covering the appendix; appendix long, chronically inflamed and constricted near its mid portion.
47	History of several attacks of acute abdominal pain.	W. B. C.—9,050.....	T-2 N-61 L-45 M-4	Appendiceal shadow visible at 72 hours; tenderness definitely localized over appendiceal shadow.	Long appendix somewhat bulbous at tip.
48	Pain in R. L. Q. at intervals with nausea and vomiting; attacks for some time; tenderness in R. L. Q. on pressure.	W. B. C.—5,450.....	N-60 L-30 M-9 E-1	Visible appendix at 96 hours; tenderness definitely localized over shadow.	Firm band of adhesions between lateral cecal wall and appendix, about $\frac{1}{2}$ inch from its base.

CASE REPORTS—Continued

No.	Symptoms	Laboratory findings	X-ray findings	Surgical findings
49	History of epigastric pain; gas; no nausea or vomiting; no relation to food.	W. B. C.—7,000 N-48 L-50 M-1	Large appendix visible at 96 hours; slight tenderness definitely localized over appendiceal shadow.	Appendix enlarged and there were two bands of adhesions in mid portion constricting appendix.
50	Pain and gas in stomach region; constipated; no nausea or vomiting; no hunger pains.	W. B. C.—11,800 N-55 L-29 M-11 E-3 B-2	Tenderness definitely localized along appendiceal shadow at 96 hours.	Long appendix with several constrictions; omentum adherent to cecum and down in right iliac fossa; scar on duodenum.
51	Pain in epigastric region; no history of nausea or vomiting; no tenderness; gastric symptoms indefinite.	W. B. C.—4,850 N-50 L-44 M-4 E-2	Curled appendix at base of cecum; slight tenderness over appendix shadow at 24 hours; shadow not so marked at 48 and 72 hours.	Appendix firmly bound down and kinked in its middle third.
52	Periodic attack of acute indigestion and chronic constipation for 5 years.	W. B. C.—6,500 N-53 L-40 M-2 T-2 E-3	Slight tenderness over appendix shadow and base of cecum at 72 hours; tenderness definitely localized.	Long appendix bound down in iliac fossa; contained fecoliths.
53	Violent pain in lower abdomen lasting 2 to 3 days, associated with diarrhea, 3 months interval; pain not definitely localized in R. L. Q.	W. B. C.—8,600 N-59 L-36 M-4 E-1	No appendix shadow seen; no tenderness over base of cecum or in appendix area.	Appendix small and sclerotic type, bound down in iliac fossa; adhesions between ascending colon and greater omentum.
54	History of vomiting spells; sick 3 to 4 days; pain in R. L. Q. over McBurney's point.	W. B. C.—7,650 N-75 L-19 M-3 E-2 T-1	Appendix visible at 72 hours; tenderness definitely localized over base and tip at 72 hours.	Appendix long and bound down in right iliac fossa.
55	Nausea and generalized abdominal pain; no vomiting; tenderness over McBurney's point.	W. B. C.—8,250 N-65 L-28 M-4 E-2	Long appendix visible at 96 hours; tip apparently fixed; pain on pressure over appendix shadow.	Long free appendix containing fecal concretions.
56	Repeated attacks of gastric distress and nausea for 1 year; pain in right upper and lower quadrants; slight tenderness in R. L. Q.	W. B. C.—7,400	Barium in appendix at 72 hours; tenderness definitely localized over appendix shadow.	Appendix was retrocecal and bound by adhesion.
57	Attacks of abdominal distress; pain in R. L. Q.; during attack has pain nausea and diarrhea; tenderness slight in R. L. Q.	W. B. C.—5,450 N-61 L-36 M-3	Appendix visible at 72 hours; slight tenderness definitely localized over appendix shadow.	Appendix was bound down by adhesions; was kinked and showed signs of chronic inflammation.

COMPARISON OF THE KAHN AND KOLMER REACTIONS

By PAUL RICHMOND, JR., Lieutenant Commander, Medical Corps, United States Navy

At the United States Naval Hospital, Great Lakes, Ill., both the Kahn and Kolmer reactions have been done in 2,050 consecutive routine tests on blood serum and 263 on spinal fluids.

The technic as described by Kahn in his book "Serum Diagnosis of Syphilis by Precipitation, 1925," has been followed. The 15-minute incubation period has been included and reactions checked the following day after allowing the tubes to stand overnight in the ice box. The standard Kolmer technic has been adhered to with overnight fixation in the ice box, except for the spinal fluids in which a 30-minute fixation period in the water bath at 37° C. was used.

The results are shown graphically.

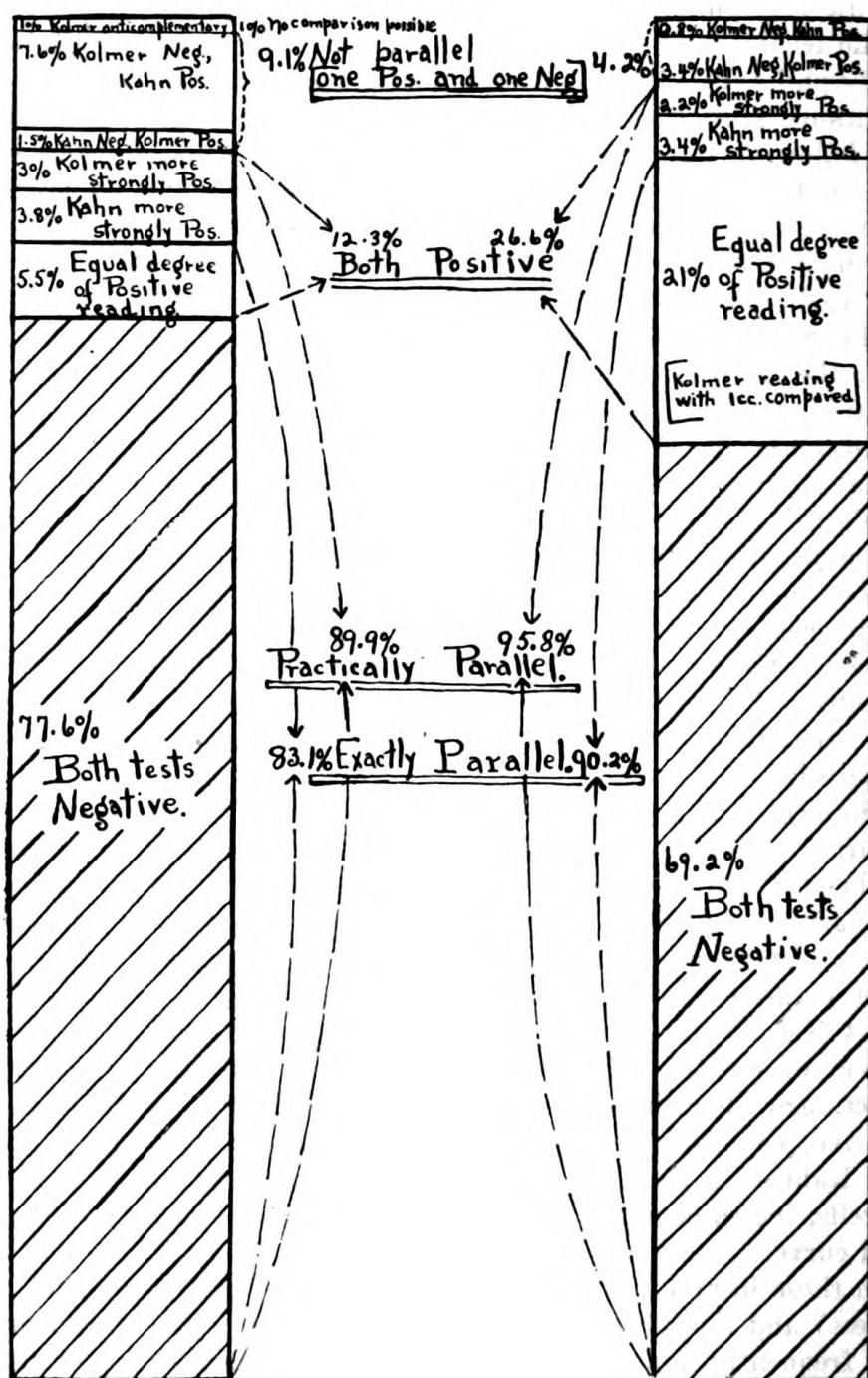
In the 21 tests, constituting 1 per cent, in which the Kolmer reaction was anticomplementary, no comparison can be made. In 12 instances the Kahn was negative and the patient not thought to have syphilis. One patient who was a morphine addict and had a cellulitis gave an anticomplementary reaction with the Kolmer and a negative Kahn test on two occasions two weeks apart. In all but one of the nine instances in which the Kolmer was anticomplementary and the Kahn positive syphilis was believed to be present. The other case left the hospital before the tests could be repeated. Four of these patients later gave several strongly positive reactions in both tests, two giving complete serological evidence of paresis.

The degree of positive reading by one method when the other was negative varied from doubtful, \pm , to strongly positive, 4+. Some of these were known cases of syphilis having been under treatment for varying periods of time. One patient with an aortic aneurysm and a history of syphilitic infection gave a negative Kolmer on three occasions and a \pm Kolmer on three other occasions with a 4-4-4 Kahn reading all six times. One patient giving a definite history of syphilis with about 12 years treatment (46 arsphenamine injections with an indeterminate amount of mercury), had a strongly positive, 4+, Kolmer reaction on four successive tests with a negative Kahn each time. His spinal fluid gave a 4+ with both tests, 52 cells, increased globulin, and a tabetic type of Lange's colloidal gold curve.

In those instances where one test was only slightly positive (2+ or less) and the other negative, except in cases under treatment, it was frequently impossible to find any other evidence of syphilis or get a history of previous infection. Such cases were therefore con-

Blood serum.
2050 tests

Spinal fluid
263 tests



sidered false positives and not given a diagnosis of syphilis by the medical officer in charge. In nearly all of these instances the Kahn was the test giving the false slightly positive reaction.

When one test was more strongly positive than the other the Kahn tended to be more sensitive, although there were several exceptions in which the variation was repeated each time blood from that patient was tested. All patients whose blood repeatedly showed a positive reading in both tests were considered to have syphilis. In nearly all instances a history of infection or other evidence was also present.

When both tests gave an equal degree of positive reading they were usually 4+. These included many cases of known secondary, tertiary, and cerebrospinal syphilis. Some had been under treatment for long periods. Most showed a reduction in positive reading in one or both tests under continued treatment. The Kolmer more frequently receded earlier. A number were cases which were strongly suspected, from clinical evidence, of having syphilis, but the serum reactions were necessary or desired to confirm the diagnosis. In some instances, however, the serum reactions were wholly unexpected and explained obscure symptoms or were present where no history of infection or other symptoms were present. If repetition of the tests gave the same results syphilis was considered to be present.

In the tests on spinal fluids most of the positive readings were in known or suspected cases of cerebrospinal syphilis and the cell counts, globulin tests, and Lange colloidal gold curves both confirmed the evidence and determined the type of disease.

These tests proved of value in diagnosing early cerebrospinal syphilis before clinical symptoms were present and in separating neurosyphilis from the numerous other neuropsychiatric disabilities present among the Veterans' Bureau patients. There was less disparity between the positive readings and there were fewer confusing reactions in the spinal-fluid examinations than in those of the blood serum.

From experience with the above tests the following conclusions seem justified:

1. Frequent repetition of the tests in cases giving reactions which were not parallel largely accounts for the lack of correlation of the tests.
2. The two tests serve as a valuable check on each other.
3. Repeated strongly positive readings in both tests are sufficient evidence to diagnose the presence of syphilis.
4. Repeated strongly positive readings in one test may occur when the other test remains negative or only slightly positive. Syphilis is probably present in all such cases.
5. Repeated slightly positive readings in either one or both tests may be present in known cases of syphilis, especially after treat-

ment. It is thought that such readings indicate the presence of syphilis.

6. False positives of slight degree, \pm to $2+$, not believed to indicate syphilis, are more frequent in the Kahn test but usually disappear if the test is repeated at an interval of a week or longer. Such reactions are very seldom present in both tests at the same time.

7. Occasionally a strongly positive reaction, especially in the Kahn test, is of diminished degree or disappears after an interval of a week or more without treatment. The significance of this is not known. Other evidence of syphilis is not present or is not conclusive.

8. If the Kolmer reaction is anticomplementary and the Kahn positive, syphilis is probably always present.

COMMENTS ON THE ORIGIN OF DISABILITY⁵

By LEWIS W. JOHNSON, Lieutenant Commander, Medical Corps, United States Navy

RECENT DECISIONS

There are several "in line of duty" decisions published in Court-Martial Order No. 6, dated June 30, 1926, which are of interest to the Medical Department.

Among these may be found:

Disability, Line of Duty.—An individual was examined for appointment as midshipman June 3, 1924, and no physical defects were noted. On December 7, 1925, at the annual examination of midshipmen, he was found to have defective color perception. On March 15, 1926, he was reexamined and rejected on account of this disability. On April 2, 1926, he was admitted to the sick list at the Naval Academy with diagnosis of myopia, not in the line of duty, the medical officer being of the opinion that the condition existed prior to the appointment.

HELD: In view of the fact that the physical examination of the midshipman at the time of entrance to the Naval Academy showed no defect in vision, that the physical examination of December 7, 1925, did not disclose the disability of myopia, and that there are no affirmative facts showing that either of said disabilities existed prior to his appointment to the Naval Academy, the Navy Department is of the opinion that each of said disabilities, i. e., defective color perception and myopia, should be held to have originated in the line of duty. (File OO-Burton, Eugene PIP./2-5 (2) (260508) J:AC; May 17, 1926.)

Disability in line of duty.—W. enlisted in the Marine Corps on October 2, 1925, and no physical defects were noted. On March 26, 1926, he was admitted to the sick list with a diagnosis of "flat foot," origin not in line of duty and not the result of his own misconduct. The man admitted that for a period of about four years prior to his entry into the Marine Corps he suffered with pain and weakness of both feet, but since his entry into the service these symptoms had been much exaggerated, and are now such as to incapacitate him for the proper performance of his duty.

⁵ From U. S. naval hospital, Mare Island, Calif.

HELD: While statements describing certain physical conditions noticed prior to enlistment may be considered as evidence tending to show that the disability discovered had its origin prior to enlistment and not in the line of duty, it is not deemed advisable that the statement of an individual in the naval service to the effect that he had the disability complained of prior to enlistment should be accepted as conclusive evidence of said fact, unless such statement of the claimant contains a description of certain physical conditions which he had noticed prior to his enlistment, which conditions could have no other plausible explanation than that he was suffering from the disability complained of prior to his enlistment in the naval service. Since enlisted men of the Marine Corps are given two medical examinations prior to their enlistment, in each of which the feet of the recruits are most carefully examined, the Navy Department is of the opinion that the statement of W. can not be accepted as proof of the fact that he had flat feet prior to his enlistment in the Marine Corps. (File ML-White, Marvin F./P13-2 (280427) J: AC; May 8, 1926.)

Disability, line of duty, not the result of his own misconduct.—D. enlisted in the Marine Corps October 16, 1922, and served approximately three years and six months prior to the onset of his present disability. A board of medical survey convened at the naval hospital, New York, and found that he was suffering from constitutional psychopathic inferiority, without psychosis, and held that in its opinion said disability did not originate in the line of duty and it was not due to misconduct.

HELD: Applying the decisions of the Navy Department of November 30, 1925, July 22, 1922, May 19, 1921, and July 1, 1923, to the present case, the disability is held to have originated in the line of duty and not due to misconduct. (ML-Delsardo, Bartholomew/P2-5 (1) (260510) J: AC; May 15, 1926.)

Disability, line of duty, not due to own misconduct.—S. enlisted in the Navy October 1, 1925, and no physical defects were noted upon his enlistment. He was admitted to the sick list March 22, 1926, with a diagnosis of mental deficiency, and transferred to the naval hospital, New York, where his diagnosis was changed to psychopathic constitutional inferiority, without psychosis. On May 5, 1926, a board of medical survey convened in his case confirmed this diagnosis and considered that the disability complained of did not originate in line of duty but existed prior to enlistment.

HELD: This case is in all respects similar to the cases referred to in the opinion of the Navy Department approved May 15, 1926, and applying the holdings in the cases referred to in that opinion to the case of S., the Navy Department is of the opinion that the disability complained of should be held to have originated in the line of duty and not the result of his own misconduct. (MM-Snyder, Sylvester P./P2-5 (2) (260525) J: AC; June 9, 1926.)

Reference is made to mental deficiency, constitutional psychopathic states, and color blindness. These conditions are, without doubt, congenital. It is difficult to conceive that they might even be exaggerated by service conditions.

The following comment places the responsibility entirely upon the medical officer:

Since enlisted men of the Marine Corps are given two medical examinations prior to their enlistment, in each of which the feet are most carefully examined, the Navy Department is of the opinion that the statement of W. can not be accepted as proof of fact that he had flat feet prior to his enlistment in the Marine Corps.

RECRUITING OF THE UNFIT

Under the present system it is impossible for the recruiting officer to determine many of the conditions which might be cause for rejection. This is especially true of neuropsychiatric conditions. The psychopath is notoriously cunning and is able to make an exceptionally good appearance for a short time. The mentally deficient can not be picked out without psychological examination. The epileptic can not, ordinarily, be diagnosed unless seen in an attack. It is not uncommon to find men who have a history of commitment to schools for the feeble-minded, reform schools, and hospitals for insane. One patient, who was recently a patient in this hospital, had been in a State hospital three times as a criminally insane patient. Another, who had committed murder, escaped from a Veterans' Bureau hospital and enlisted within a week after his escape. As to actual physical disabilities, flat feet may be used as an example. A man may have flat feet, which are definitely flat, without ever having had a symptom. This man might be good service material. On the other hand, a man may have perfectly good-looking arches and still be unable to walk because of pain. Many obscure conditions do not show objective manifestations, and the anxious recruit will deny symptoms.

It has been argued that morons may make good service material, as they may work well and make a fairly good service adjustment. This may be true to a certain degree, but does not excuse the enlisting of men who can not read or write more than their name. Practically every man in the service is called upon to rely upon his own judgment at one time or another. It can not be expected that a man will show mature judgment whose mental age is from 7 to 12 years. It is the mentally deficient and the psychopath who can not adjust themselves to discipline and who fill the prisons and psychopathic wards.

RESPONSIBILITY OF THE GOVERNMENT

In view of the law, every man accepted is in perfect condition. The Government must assume responsibility for any condition which manifests itself subsequently. Every recruit is a potential pensioner and Government charge.

It may be thought that the number of recruits who "get by" with physical and mental disabilities is so small that it does not pay for the Navy to discriminate too closely. From the Navy's point of view this may be true, as the Navy's responsibility ceases as soon as the man is discharged. The taxpayer, who must supply the Pension Bureau with funds, deserves some consideration.

The percentage and amount of pensions may be small; however, the matter deserves consideration.

SURVEY OF CASES

The neuropsychiatric services of the hospitals afford an abundance of material for study and are probably affected more than other services. There are 28 patients in the neuropsychiatric service at this hospital. Thirteen, or 46+ per cent, have conditions which existed prior to enlistment, but they must be carried as "in the line of duty." Although the service is light, due to the recent transfer of a draft to St. Elizabeths Hospital, this is a fair example of the class of patients admitted during the past two years. It should also be borne in mind that there is a small percentage of recruits in this district, there being no training station.

Below is a résumé of patients and their conditions.

Case 1.—Enlisted June 12, 1926.

Diagnosis: Dementia precox.

Days of actual duty: Nineteen.

Note: Enlisted to "make a man of himself." Unable to adjust himself. Has had a stricture of urethra, with symptoms, since age of 17.

Case 2.—Enlisted July 13, 1926.

Diagnosis: Dementia precox.

Days of actual duty: One hundred and seventeen.

Note: Enlisted because he could not make a good social adjustment. Enuresis. Masturbation since age of 8. Lived with homosexual pervert for one year. Always seclusive.

Case 3.—Enlisted July 20, 1926.

Diagnosis: Dementia precox.

Days of actual duty: Eighty.

Note: Fainting spells since age of 14. Injured himself to obtain discharge from service.

Case 4.—Enlisted June 28, 1926.

Diagnosis: Dementia precox.

Days of actual duty: One hundred and twenty-one.

Note: Note made shortly after enlistment, "Pes planus; 1½ inches under height."

Case 5.—Enlisted July 14, 1926.

Diagnosis: Nystagmus.

Days of actual duty: One hundred and twenty-two.

Note: He admits condition has existed as long as he can remember (probably congenital defect).

Case 6.—Enlisted August 15, 1923.

Diagnosis: Epilepsy.

Days of actual duty: Two years and eight months.

Note: History of attacks for five years.

Case 7.—Enlisted April 13, 1926.

Diagnosis: Epilepsy.

Days of actual duty: One hundred and ninety.

Note: History of epilepsy since age of 10.

- Case 8.*—Enlisted June 16, 1926.
Diagnosis: Epilepsy.
Days of actual duty: Ninety-four.
Note: History of epilepsy since age of 5.
- Case 9.*—Enlisted July 30, 1923.
Diagnosis: Epilepsy.
Days of actual duty: Three years, three months.
Note: History of attacks in 1921.
- Case 10.*—Enlisted June 26, 1926.
Diagnosis: Psychoneurosis, neurasthenia.
Days of actual duty: Seventy-six.
Note: Two brothers and one sister are insane. Eye "trouble" for three years. Note 6-28-26 "Kyphosis."
- Case 11.*—Enlisted July 28, 1926.
Diagnosis: Constitutional psychopathic state, emotional instability.
Days of actual duty: One hundred and ninety.
Note: History of instability and somnambulism.
- Case 12.*—Enlisted March 30, 1926.
Diagnosis: Constitutional psychopathic state, mental deficiency.
Days of actual duty: One hundred and eighty-eight.
Note: Quit school at age of 16, in fourth grade, because he could not pass. Enuresis until age of 10. Pes planus.
- Case 13.*—Enlisted April 6, 1926.
Diagnosis: Encephalitis, lethargic.
Days of actual duty: One hundred and one.
Note: Condition has existed since 1921.

The average length of actual service of 11 of these patients is 118 days. (The other two have served over two years.) Attention is called to the fact that one man has been on actual duty only 19 days.

When the cost of transportation, equipment, training, and hospital treatment is considered, it must be admitted that the enlistment of these men was not a good business transaction.

The actual cost, at 5 cents a mile, to transfer these men home will amount to approximately \$1,200. (Only one lives as far east as Chicago.) With the exception of two men, their pay for the time in the Navy has been a total loss, so far as returns in service are concerned.

SUGGESTIONS FOR SOLUTION OF THE PROBLEM

Under the present system, the only solution to this problem lies in more careful observation before the recruit is accepted.

This may be accomplished by (1) a careful checking up on his past history or by (2) a period of probation.

(1) A careful checking up on his past history:

Have the recruit present a statement by some responsible person as to his schooling, social adjustment, and health. If a recruit has not established himself well enough to obtain such a statement, his

desirability for the service is doubtful. A careful checking up on schooling, employment, and change of location gives a definite indication as to his social adjustment.

The physical examination should be more thorough. Not infrequently recruits are accepted with gross defects. A patient who is up for survey at the present time, for a definite eye defect, claims that his eyes were examined by a hospital corpsman.

Psychological examinations apparently have not met with favor, but it must be admitted that they are of some value. At least, the recruiting officer should determine whether or not his applicant can read and write.

(2) Period of probation:

This is practiced to a certain degree in the training stations, although it apparently has not been effective. If the recruits were taken on probation for from three to six months before they are actually accepted, many of these defects would show up and the man could be dropped without further responsibility on the part of the Government.

This is not a new problem, but the recent policy of the "duty status" adds a greater responsibility for the Medical Department. Under the present conditions, statistics of service-connected morbidity give a false impression.

The solution of the problem lies in the recruiting office and rests largely on the medical officer.

DEPARTMENT OF SANITATION, MARINE BARRACKS, QUANTICO, VA.

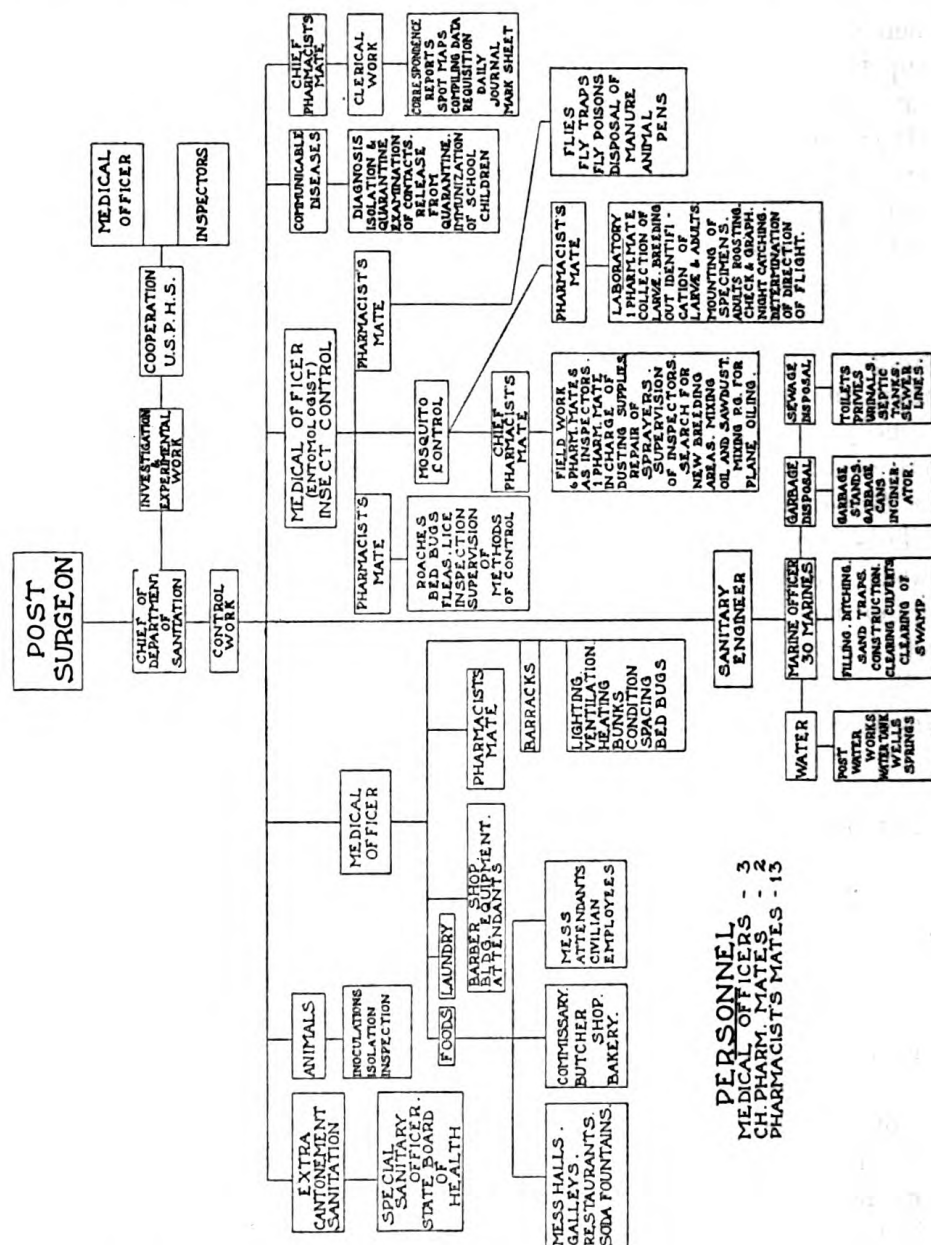
By W. M. GARTON, Captain, Medical Corps, United States Navy

The marine barracks at Quantico, Va., being one of the largest stations, if not the largest, in the United States proper, and covering such a vast area of territory, it follows that the sanitary problems that arise are such that they must be handled from many angles, and the formation of a department to meet the ever-rising sanitary conditions has become a necessity.

In addition, this post surrounds the town of Quantico, and at the entrance to the post is the rapidly growing town of Triangle. It will be seen that the extra-cantonment feature has to be taken care of and properly controlled.

The Medical Department has been reorganized and the graph which follows shows clearly each departmental division. All are under the direct command of the post surgeon, who makes weekly inspections, accompanied by the heads of divisions. The four departments are brigade activities, dental service, hospital activities, and the sanitary division.

In the establishment of the department of sanitation a radical departure from anything heretofore attempted had to be instituted. The basic idea was to develop a department that would not only



meet the local conditions but would be adaptable to other marine posts, naval training stations, and, in a minor degree, navy yards.

In order to have this department systematically organized and established in a satisfactory working condition, and in order to obtain satisfactory results, a sufficient and trained personnel must be provided. First, the chief of the department of sanitation must be an

officer not only interested in this kind of duty but more or less instructed and trained along these lines. His assistants must be younger men of marked energy and initiative and must take a decided interest in their duties, while the enlisted personnel must also be selected men who can be trained and who are able to carry out their respective duties. All this work is of a more or less independent character, and it is readily to be seen, although a close and general supervision is planned, initiative and attention to duty by all is very essential.

It will be noticed in the graph that the various divisions show the duties and work contemplated under the various heads. It is not necessary to state the rules and regulations of the various divisions, nor to give a detailed descriptive outline of the work contemplated, as this work is more or less fully covered in various text-books on hygiene and sanitation. These rules and regulations are naturally divided under the various heads, viz, (a) extra cantonment, (b) hygiene and health control, (c) sanitary engineer, (d) communicable diseases, (e) entomologists, and, finally (f) administration. At this post a booklet has been prepared under the title, "Post Sanitary Regulations." This has been approved by the commanding general who states, "Organization commanders will be held responsible for the strict enforcement of these instructions."

The chief of the department of sanitation has working with him, for investigation and experimental work, a medical officer of the Public Health Service, who really not only collaborates with him in his duties but is a great aid not only in advising and suggesting, but also in helping him make the various decisions that are necessary.

Inspectors of the Public Health Service are trained men along their lines and are a great aid in not only checking but investigating the various sanitary problems that might arise.

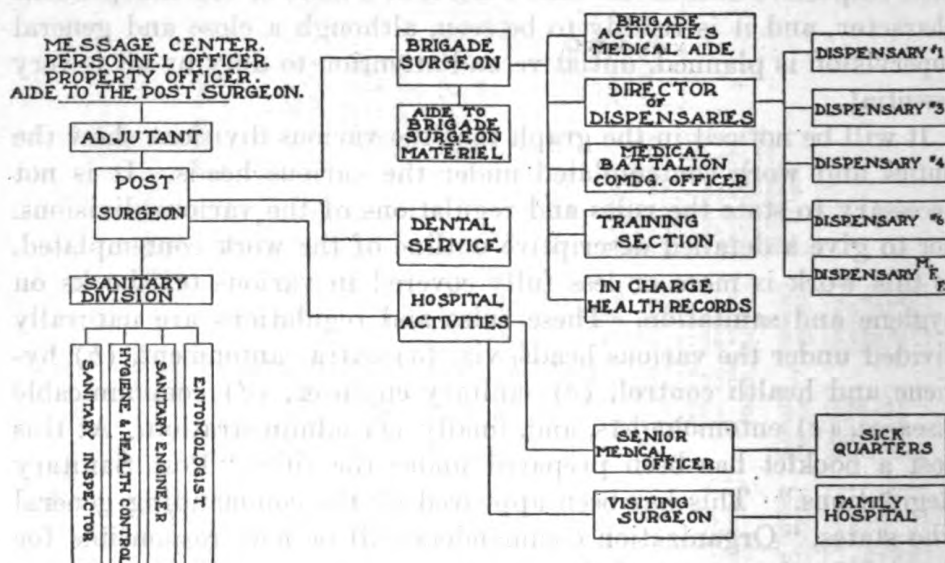
The control work is under the chief of the department of sanitation, who has as his aids two junior medical officers. Where these are not available, or the work is not of such a magnitude as to warrant their assignment, a chief pharmacist or a chief pharmacist's mate can be substituted.

The sanitary engineer is a marine officer. Thirty marines are assigned to him. The graph clearly shows their duties. At naval stations this department could be placed under appropriate heads with the necessary enlisted personnel.

The division designated "entomologists" has had charge of the mosquito control of the past season, in which Paris green was dusted and oil sprayed from airplanes, which will be described at the end of the coming season. It will suffice to say that the results were most

satisfactory. A more practical working basis will be developed and the final results, no doubt, will reward all those who are planning this coming campaign.

ORGANIZATION OF THE MEDICAL DEPARTMENT MARINE BARRACKS, QUANTICO, VIRGINIA.



The graph, which is really a working sheet, is all that is necessary, after careful study, with the required complement and proper approval, to put this plan into full effect.

It is believed, as was originally stated, that this is applicable not only to marine posts but to naval training stations and navy yards, as well as other naval activities ashore.

CLINICAL NOTES

CHOLECYSTOGRAPHY¹

WITH REPORT OF CASES

By G. H. LARSON, Lieutenant, Medical Corps, United States Navy

Since the work of Graham, Cole, and others great interest has existed in and continual experimentation has been carried on with tests and technique designed to perfect chemicals and methods for use in improved gall-bladder visualization (1).

Prior to the use of sodium tetraiodophenolphthalein the more toxic bromine salt and the intravenous method were used exclusively. These were followed by severe reactions and in many cases venous thrombosis resulted as a permanent aftereffect. Some of the incidental reactions were abdominal cramps, cold sweats, dizziness, headache, marked nausea and vomiting, and severe diarrhea. At times there were symptoms of more or less shock. When iodine replaced bromine in the chemical and the oral use replaced the intravenous method of administration practically all of these untoward effects were obviated without loss of efficiency. Indeed, in our own very limited number of cases the use of the iodine compound has resulted in a greatly improved utility; moreover, the patient never objects to a repetition of the test (7). We may state at once that the oral administration has given us by far the better results, and these have been so satisfactory that the intravenous method has been discontinued and it will not be resumed unless further experience with the oral method proves unsatisfactory. The intravenous method as a check on results obtained by the oral method is well understood but up to this time has seemed unnecessary.

This diagnostic aid has become so useful and so generally applicable that it may well rank with insulin as one of the two greatest discoveries of this decade. This is better appreciated when it is realized that previous to the perfection of this test Röntgen ray evidence of chronic cholecystitis was never obtainable; of empyema of the viscus, rarely; and of cholelithiasis in about 15 to 20 per cent of cases. The fact that the gall bladder contributes such a high

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percentage to the total number of pathological conditions found in the upper abdomen emphasizes further the value of this procedure and indicates what credit should be accorded it.

In the years 1919 and 1920 J. T. Case, at Battle Creek, and T. W. Raison, at Great Lakes, were carrying on experiments with visualizing substances and opaque materials. The use of sodium iodide intravenously and of phenolphthalein by oral administration at the same time were used and resulted in the liver and genito-urinary tract showing some increased opacity to Röntgen rays, but we have never seen the results of these experiments published.

More recently we have the preliminary report of the metamere of the halogenated phthaleins, namely, phenoltetraiodophthalein, which is said to be much less toxic, more rapid in its absorption and excretion, with little if any tendency to produce thrombophlebitis. The dosage is said to be only approximately one-half of the halogenated chemicals and yet it will stain the serum sufficiently to give a good liver-function test (2). The same investigators who discovered and perfected all of the above-mentioned compounds report the discovery of still another substance, tetraiodo-isophenolphthalein for oral administration.

The cases reported were all encountered in our routine work and, in some, the presence of gall-bladder pathology was not suspected, the visualization tests being carried out to view the results, in cases of normal gall bladder, as a check on technique. The more important ones will be illustrated by skiagrams. Two cases in which the salt had been administered but in which no shadow of the gall bladder was found on any film came to operation. The lack of shadow was the determining factor in the diagnosis, and the microscope, as well as the gross pathology, proved the diagnosis to have been correct.

Technique.—

1. Five 1-gramme gelatine capsules of the chemical are prepared by dipping in hot salol solution, so that only the thinnest possible coating is obtained.
2. Two hours after a light evening meal containing a minimum of fat all of the capsules are administered at once, together with 40 grains of sodium bicarbonate. The bicarbonate is repeated every four hours for a period of 48 hours.
3. The patient is instructed to lie on his right side to expedite the passage of the salt from the stomach through the pylorus (1).
4. Report for first film 12 hours after the salt is administered. No breakfast nor lunch is permitted, but water is freely allowed following the ingestion of the medicine.
5. Films are made at 12, 16, 20, 24, and 36 hour intervals following the medication.

Findings.—

Normally the 12-hour film shows a well-defined gall bladder and the lower edge of the liver is well outlined, so that there is no possibility of mistake. At 16 hours the normal gall-bladder shadow becomes more opaque, as more and more of the dye is secreted and stored. The opacity is now at its maximum intensity and the shadow is seen to be homogeneous throughout unless marred by intestinal gas; however, this is identified without difficulty and scarcely enters into the diagnostic problem. Removal of the dye by emptying of the viscus is noted in the next (20-hour) or in the 24-hour film; in fact it may have emptied in the interval between these two films. The 24-hour film shows no shadow unless pathology exists or the technique has been faulty. Too heavy a coating on the capsule or anything else which tends to delay absorption will prevent good results and must be taken into consideration. The sections of capsules or particles of the salt which remain unabsorbed may easily be seen in the intestinal canal and should be taken into consideration when interpreting the films. Delayed absorption results in delayed secretion by the liver and, therefore, delay in the appearance and disappearance of the shadow.

CASE REPORTS

Case 1.—O. B.; white male; age, 42; weight, 176 pounds. Admitted January 19, 1926. T. P. R., normal. *Diagnosis:* Undetermined. *Complaint:* Pain in the epigastrium extending to the right back. *Family history:* Nothing of importance. *Habits:* Sedentary, heavy coffee drinker, admits the moderate use of alcohol. *Personal history:* Two reputed attacks of renal colic, 1908–1921. Peptic ulcer diagnosed in 1918 with apparent medicinal cure. The gastrofluoroscopic examination did not substantiate this diagnosis on this admission. *Physical examination:* Skin somewhat sallow. Blood pressure, 185/95, which subsequently became stabilized within normal limits. Liver three fingers below the costal arch and somewhat tender. All other findings were normal. *Laboratory reports:* Gastric contents after an Ewald test meal: Free HCl, 60°; total acidity, 77°; occult blood, negative. Urinalysis, negative. White blood count and differential, normal. Gastrointestinal series, normal, except for “strung-out” appearance which has been said to indicate gall-bladder disease. Teleoroentgenogram, normal, except for “pressure knob.” Blood picture, normal. Bromsulphalein test, normal. Icteric index, 12.5 (7). *Gall-bladder visualization test:* (Sodium tetralodophenolphthalein by mouth). Gall-bladder visualized in 12-hour film; well filled, rather small viscus. Sixteen-hour film shadow is more homogeneous and shows increased density. Twenty-hour, viscus nearly empty. Twenty-four hour shows no shadow. *X-ray diagnosis:* Normal gall bladder.

Case 2.—W. D. R.; white male; age, 24; weight, 165 pounds. Admitted August 19, 1925. T. P. R., normal. *Diagnosis:* Undetermined. *Complaint:* Pain in the right side of abdomen extending from the costal arch to the inguinal area. *Family history:* Father is rheumatic and has kidney trouble. *Personal history:* “Heart trouble” in 1917. Struck on the head in 1918 and unconscious for 48 hours. Appendectomy in 1922. *Habits:* Good. *Present illness:* Onset sudden with sharp pain on right side of abdomen and vomiting. *Physical*

examination: Tenderness and some spasticity of the right abdominal muscles, especially in the hypochondrium. Mitral heart murmur, thought to be functional. Otherwise essentially negative. *Laboratory reports:* White blood cells, 18,900. Polys., 84 per cent. Urinalysis, negative. W. B. C. gradually returned to normal in about 10 days. Repeated stools negative for ova, parasites, and occult blood. Teleroentgenogram shows hypertrophy of the left ventricle. Noguchi, negative. *Gall-bladder visualization:* The gall bladder was not visualized at any time during the test, and a tentative diagnosis of chronic cholecystitis was made. Operated (9-18-25); cholecystectomy. Gall bladder showed, grossly, a chronic interstitial cholecystitis, in which diagnosis the laboratory concurred.

Case 3.—G. F. L.; white male; age, 26; weight, 205 pounds. Admitted November 13, 1925. T. P. R., normal. *Diagnosis:* Undetermined. *Complaint:* Chills, perspiration, epigastric distress, and vomiting. Pain in right hypochondrium. *Personal history:* Influenza, 1918; sick two weeks. Frequent sore throat. Gonorrheal rheumatism, 1920. Syphilis, 1922, with adequate treatment to date. *Habits:* Good. *Family history:* Nothing important. *Present illness:* Onset gradual. Three months ago began having frequent colds. One month ago caught a cold from which he has failed to recover. He became gradually weaker, had night sweats, gastric distress, vomiting, anorexia, and loss of weight. He also developed pain under right scapula. *Physical examination:* The only finding on examination and prolonged observation was laryngitis, pharyngitis, and chronic infection of the tonsils. There were one or two attacks of acute bronchitis of mild type. About twice weekly he had chills, with marked hyperpyrexia to 105°, and smears were constantly negative for malaria parasites. There was constant hypotension. Temperature, 103°; pulse, 100; respiration, 20. *Laboratory reports:* Throat smears contained a few Vincent's organisms at times. Blood Wassermann and blood chemistry were constantly negative. Blood picture showed a relative lymphocytosis and after several weeks a marked eosinophilia (36 per cent). Stools were repeatedly negative, as was the sputum. Liver-function tests were normal. Duodenal drainage, of Lyon, was normal. Gastric contents following an Ewald test meal were normal. *Gall-bladder visualization:* (Intravenous sodium tetrabromphenolphthalein.) No results except a serious toxic reaction with residual thrombophlebitis of the median cephalic. Later, oral administration of the metamer iodine salt, given according to the above-outlined technique, showed normal findings. *Röntgen-ray diagnosis:* Normal gall bladder.

Tonsillectomy, after attempting to get the patient into condition to stand the operation (which was unsuccessful), uncovered a large post-tonsillar abscess and immediately cleared up the condition.

Case 4.—W. Mc. C.; white male; age, 39; weight, 168 pounds. Admitted February 20, 1926. T. P. R., normal. *Diagnosis:* Cholelithiasis. *Complaint:* Excruciating abdominal pain. *Family history:* Not important. *Habits:* Good. *Past history:* Malaria, 1912. Pneumonia, diphtheria, gonorrhea, 1916, syphilis, 1922; adequate treatment to date. *Present illness:* First attack six months ago. At present is suffering from an apparent attack of gallstone colic. Onset about two hours after eating, with severe colic and emesis. Pain localized in the right hypochondrium. *Physical examination:* Patient apparently in great pain. Hypertrophic infected tonsils. Abdomen held rigid; examination otherwise essentially normal. *Laboratory reports:* White blood cells 12,100. Polys., 80 per cent. Urinalysis, negative. Blood Wassermann, negative. Gastric contents following an Ewald test meal were normal.

Gall-bladder visualisation (sodium tetrabromphenolphthalein intravenously): Gall bladder not visible in any film. Moderately severe toxic reaction. No thrombosis. Three weeks later the metamerie iodine compound was given according to technique: Twelve-hour film, gall bladder not visualized. Sixteen-hour film, gall bladder fairly well outlined, with some evidence of stone in the superior portion. Twenty-four hour film, gall bladder well outlined and shows slight mottling. Thirty-six and 48-hour films show very little change from the 24-hour one. *Röntgen-ray diagnosis*: Cholelithiasis.

In this case there was very little doubt of the diagnosis without the definite evidence accorded by the X-ray films. Yet, important considerations are size, number of stones, and their position, location of gall bladder, and possible adhesions. It is also important to know about function and this is beautifully illustrated by the slow appearance of the dye and the length of time it was retained in the viscus. Conceivably, this might be due to slow absorption from the intestinal tract or "sluggish" liver, but the previous injection of the bromine salt failed to cast a shadow in any film up to 36 hours following the administration. The flat film was also negative for stones. The patient desired to delay operation and was discharged from the hospital.

There are some other points of interest:

Firstly. The failure of the sodium tetra-bromphenolphthalein to cast a shadow. This may be due to blocking of the cystic duct, which had relieved itself spontaneously three weeks later when the iodine salts were used.

Secondly. The delay in the appearance of the dye up to 20 hours. This opens up a great field for speculation as to absorption, secretion, torpid liver, etc.

Thirdly. The retention of the dye up to 48 hours, and probably a much longer period. Here again we may speculate as to causes.

Fourthly. The appearance of the shadow by oral administration of the salt after the intravenous method had failed, although we must remember the difference in the dye. We are inclined to believe that the use of the large doses of alkalies may assist in absorption.

Case 5.—E. J. P.; white male; age, 26; weight, 172 pounds. Admitted March 3, 1926. T. P. R., normal. *Diagnosis*: Undetermined. *Complaint*: Obstinate constipation of several months' duration. Marked abdominal distress. Severe supraorbital pain of 10 days' duration, following a cold in his head. Acute gonorrhea. *Past history*: Appendectomy, 1921. Usual symptoms and complete relief following the operation. Numerous attacks of sore throat and tonsillectomy in 1921. Smallpox in 1917. Influenza in 1918; sick one week. *Habits*: Good. Heavy coffee drinker. *Family history*: No familial disease history. *Present illness*: Onset gradual about two and one-half to three years after appendectomy, but he does not ascribe any relationship. Gastric distress, but no "point pain," no nausea nor vomiting, no relief except by a thorough evacuation of the bowels. *Physical examination*: Nose shows hypertrophic rhinitis. There is a small nasopharyngeal ulcer which is resistant to treatment, partial

blocking of the posterior nares, nasal polyps. Low-grade pan-sinusitis. All other findings except enteroptotic habitus are normal. *Laboratory reports:* White blood cells, 13,400. Polys., 81 per cent. Urinalysis shows many leukocytes. Blood Wassermann negative. Sputum negative on 10 specimens. Gastric contents following an Ewald test meal, normal. Gastrointestinal series shows evidence of colonic stasis and intestines prolapsed into the pelvis. *Röntgen-ray diagnosis:* Enteroptosis. *Gall-bladder visualization* (sodium tetraiodophenolphthalein by mouth): Gall bladder visualized in 12 hours. Sixteen-hour film shows gall-bladder shadow well outlined and homogeneous, but very small for so large a person. Twenty-hour film, shadow still visible but beginning to fade. Twenty-four-hour film, gall bladder not visualized.

This test corresponded in every detail to what we have learned to ascribe to the normal. We should like to extend the postulate that the size of the viscus may have something to do with his obstipation (5). We know that bile salts are a very important consideration in the process of digestion. The sodium taurocholate and glycocholate combine with the fatty acids to form soaps and neutral fats, and it has recently been stated that a lack of cholesterol in the gut is conducive to constipation (6).

Case 6.—W. M. W.; white male; age, 38 years; weight, 205 pounds. Admitted March 15, 1926. T. P. R., normal. *Diagnosis:* Undetermined. *Complaint:* Indigestion, belching of gas, and a feeling of fullness in the abdomen after eating, regardless of the quantity of food taken. Dizziness, heartburn. *Family history:* Mother is of neurotic temperament. Otherwise not important. *Habits:* Excellent. *Past history:* Scarlet fever, measles, and influenza, with complete recovery. Repeated attacks of tonsillitis and tonsillectomy in 1912. *Present illness:* Onset was gradual, beginning about three years ago with his present symptoms. About one-half hour after meals he develops gaseous distention and has sour eructations; later there are dizziness, palpitation, and "heartburn." There has never been actual pain present, although the distress is acute. This lasts for two or three hours and is relieved by taking food or alkalies. He feels best in the morning when his stomach is empty. For several years and about coincident with the present trouble he has been nervous. *Physical examination:* There are no abnormal findings except tenderness in the appendix and gall-bladder regions. Blood pressure 138/76. *Laboratory reports:* Gastric contents following an Ewald test meal: Amount, 120 c. c.: occult blood, positive; some mucus; free HCl, 66°; total acidity, 84°. All other laboratory procedures were normal. *Gastrointestinal series:* Duodenal cap filled normally and without defect. There is no gastric residue. There is cecal stasis and the appendix does not empty properly. There is appendiceal tenderness. *Röntgen-ray diagnosis:* Appendicitis chronic. *Gall-bladder visualization:* (Sodium tetraiodophenolphthalein by mouth.) Twelve-hour film shows well-visualized, large, pear-shaped viscus. Sixteen-hour film, same as above, except shadow is more homogeneous and opaque. Twenty-hour film, shadow has rapidly faded, but gall bladder is still visible in outline. Twenty-four-hour film, shadow not seen. Normal gall bladder.

The stomach contents in this case ran a moderately high degree of acidity until relieved by a modified Sippy diet. The history is essentially one of peptic ulcer, but his symptoms may be entirely

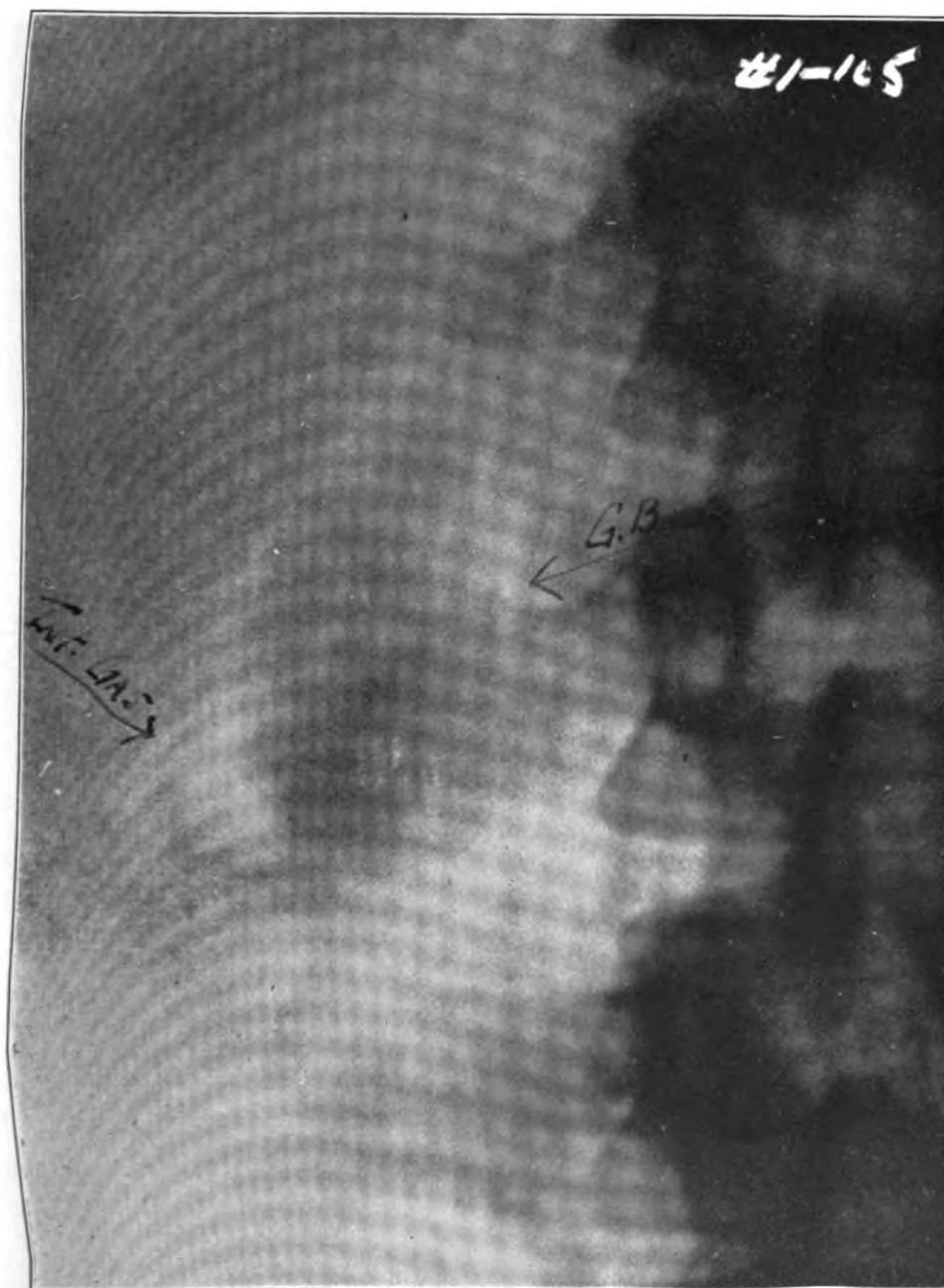


FIG. 1.—CASE 6. 16-HOUR FILM. GALL BLADDER WELL VISUALIZED
602—1

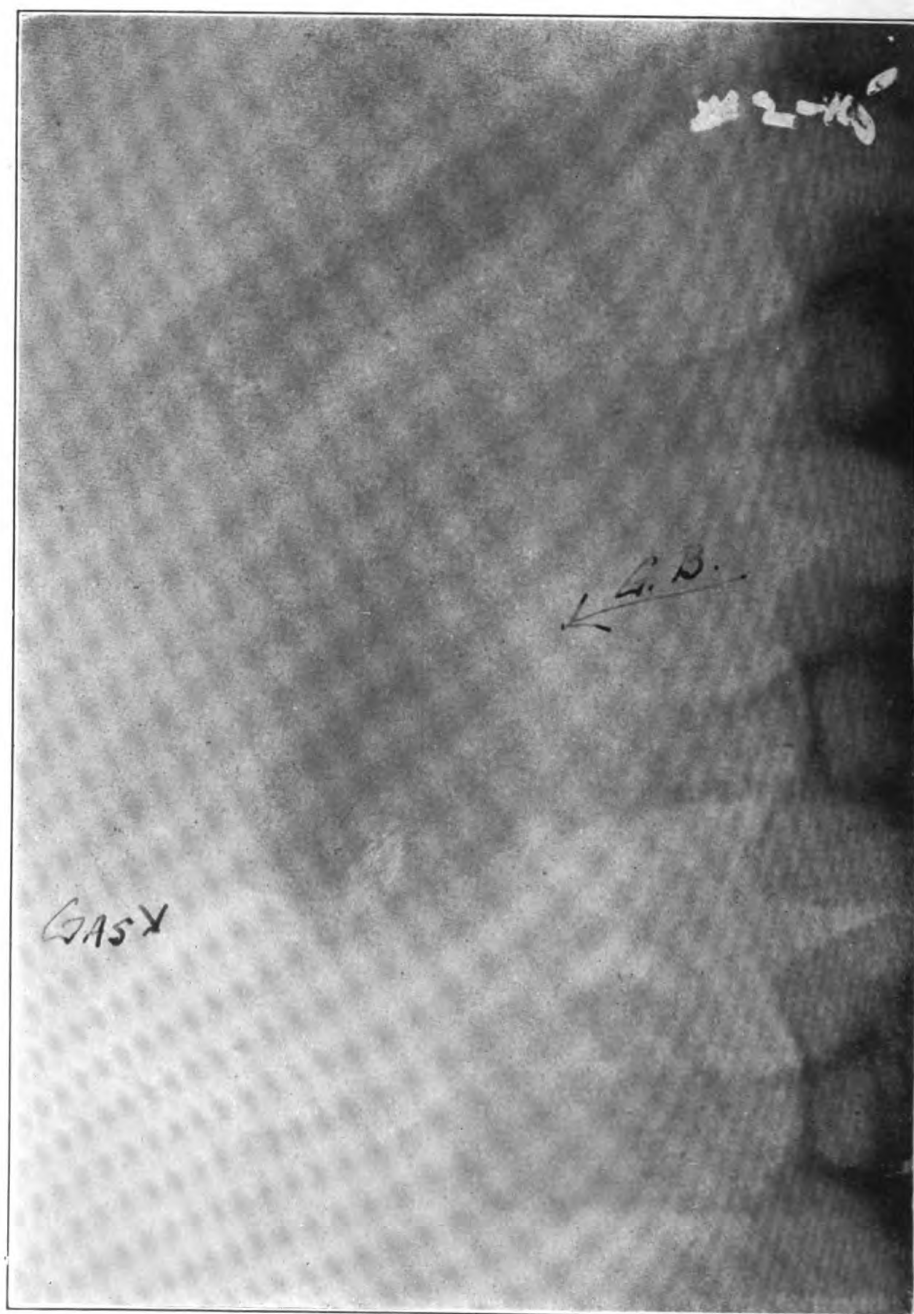


FIG. 2.—CASE 6. 20-HOUR FILM. GALL BLADDER HOMOGENEOUS. MAXIMUM
INTENSITY OF SHADOW

602-2

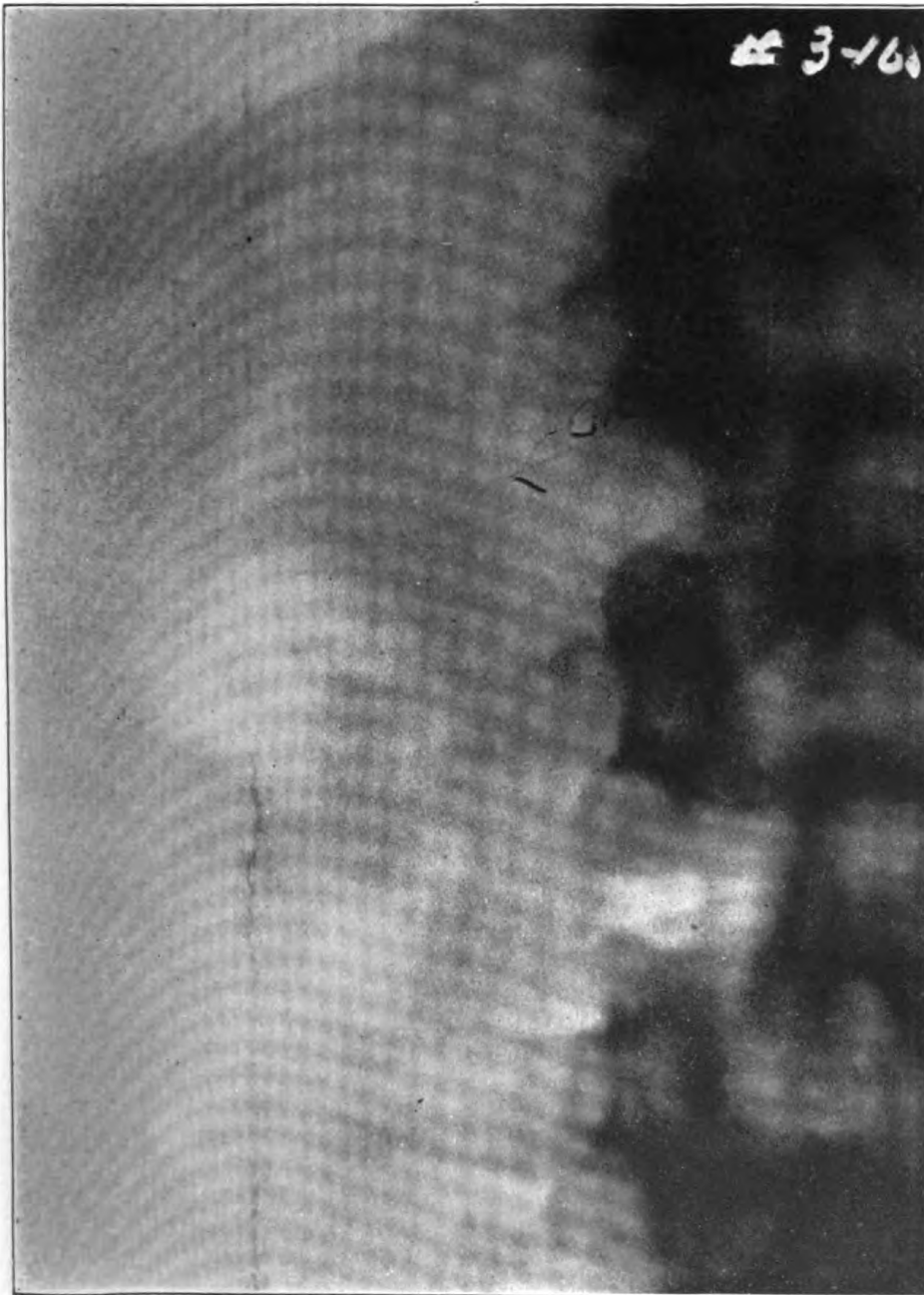


FIG. 3.—CASE 6. 24-HOUR FILM. GALL-BLADDER SHADOW BARELY VISIBLE
602-3



FIG. 4.—CASE 6. 36-HOUR FILM. GALL BLADDER NOT VISUALIZED
602—4



FIG. 5.—CASE 9. SHOWING GALL BLADDER BEFORE ADMINISTRATION OF
SALT

602—5



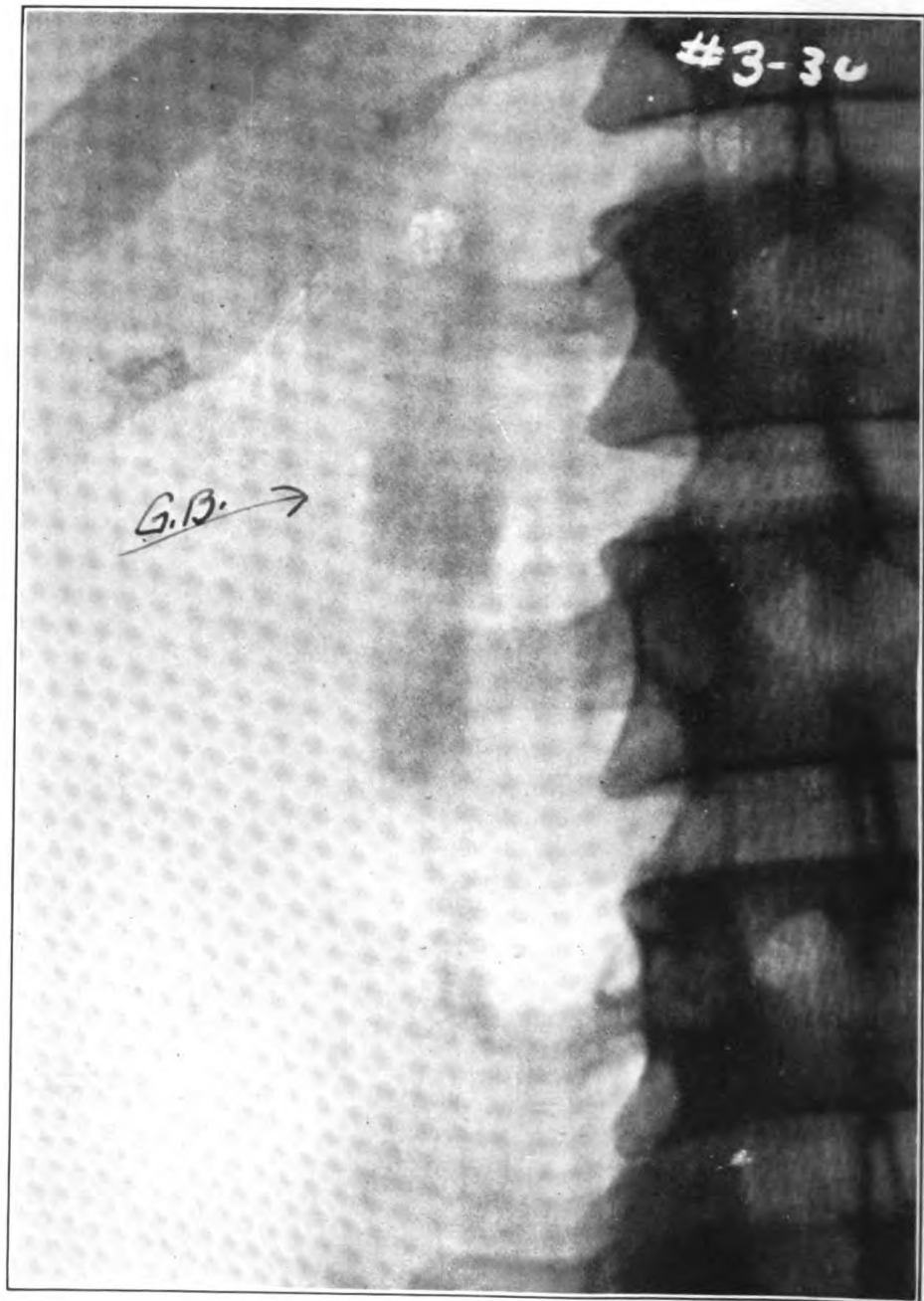
FIG. 6.—CASE 9. GALL BLADDER AFTER 16-HOUR INTERVAL

002-6



FIG. 7.—CASE 9. GALL-BLADDER SHADOW IN 20-HOUR FILM

602-7



602-8

FIG. 8—CASE NO. 9. GALL BLADDER IN 24-HOUR FILM

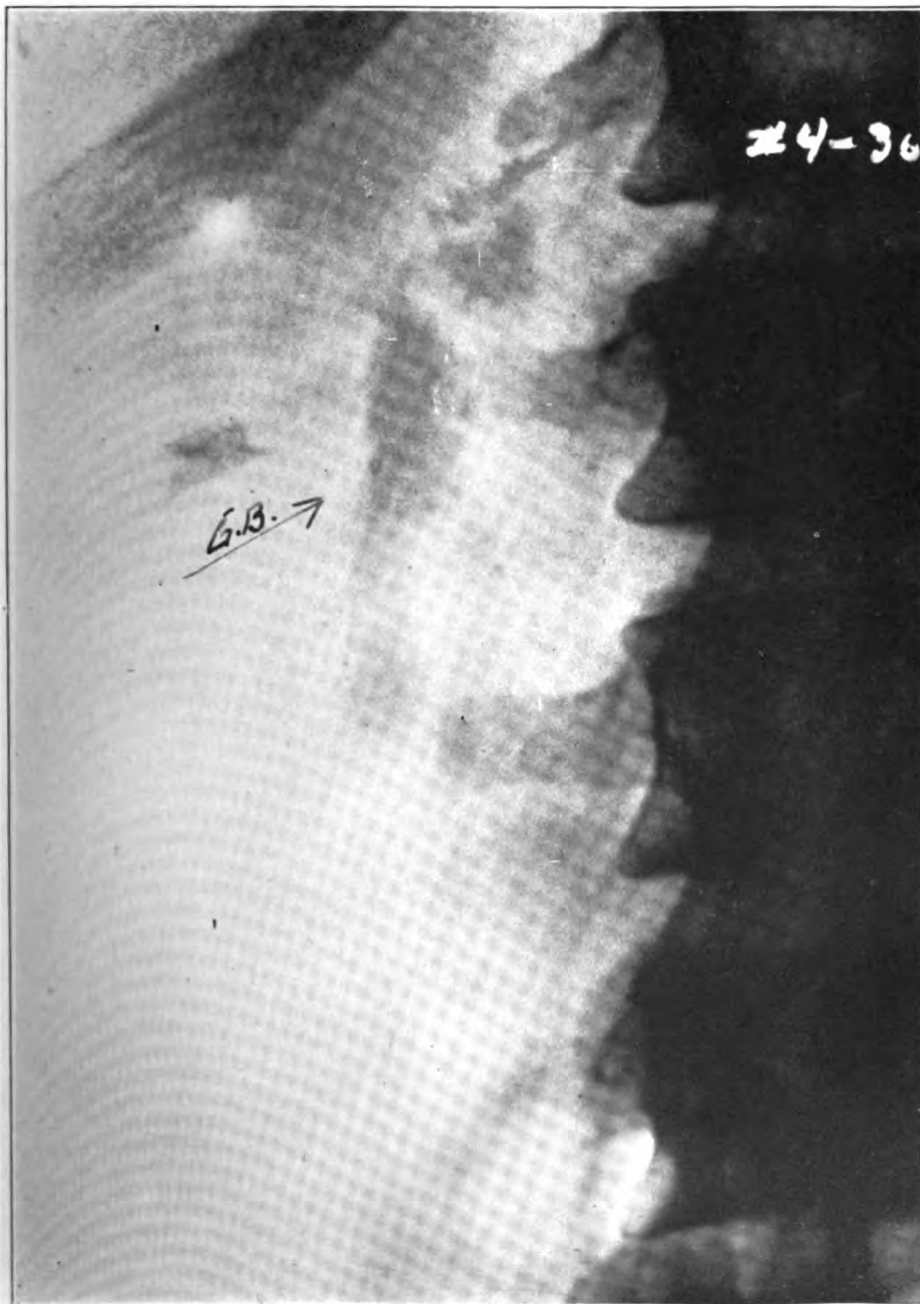


FIG. 9.—CASE 9. GALL BLADDER IN 36-HOUR FILM SHOWING NUMEROUS STONES

602—9

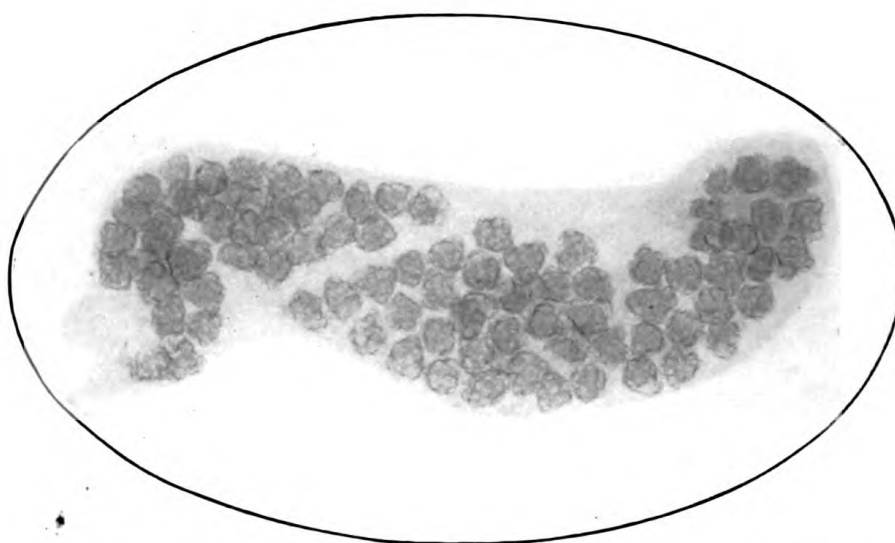


FIG. 10.—GALL BLADDER AFTER REMOVAL. 210 STONES COUNTED

602-10

due to chronic appendicitis. The patient did not desire operation at this time and was discharged from the hospital (figs. 1-4).

Case 7.—A. T.; age, 31 years; white male; weight, 158 pounds. Admitted January 19, 1925. T. P. R., normal. *Diagnosis:* Undetermined. *Complaint:* Gastrointestinal distress. Pain in the right hypochondrium. *Habits:* Good. *Family history:* He has no knowledge of his family. *Past history:* "Jaundice" in 1919. No other illness. *Present illness:* Cold in his head. Weakness, nervousness, and upper abdominal distress. No relationship of distress to his meals. Intolerant to greasy foods. *Physical examination:* Is essentially negative. There is moderate tenderness in the epigastrium, gall-bladder, and appendix areas. There appears to be very little physical basis for his complaints. *Laboratory reports:* White blood cells, 9,500. Polys., 52 per cent. Urinalysis, negative. Stools repeatedly negative for ova, parasites, and occult blood. Gastric contents, normal. Blood Wassermann, negative. *Gall-bladder visualization:* (Sodium tetrabromphenolphthalein intravenously.) No shadow on any film.

This was one of the cases which showed no shadow, came to operation, and made a complete recovery after cholecystectomy. It was one of our early cases and the determining factor was the absence of any shadow in the film. Diagnosis confirmed by microscope.

Case 8.—L. B. M.; white male; age 32 years; weight, 142 pounds. Admitted June 29, 1926. T. P. R., normal. *Diagnosis:* Cholangitis Acute. *Complaint:* Sluggishness, loss of appetite, and general malaise. *Family history:* Not important. *Habits:* Excellent. *Past history:* Pneumonia in 1908. Frequent colds. Arthritis when 7 years of age. Tonsillitis frequently until after tonsillectomy in 1924. *Present illness:* Onset slow. Began one week ago with a feeling of sluggishness, loss of appetite, and the onset of jaundice. *Physical examination:* There is a generalized icterus, the abdomen is tender over the liver area which extends several finger breadths below the costal arch. The feet show marked callosities on the plantar surface. All other physical findings are normal. *Laboratory reports:* White blood cells, 7,100. Polys., 68 per cent. Urinalysis shows a trace of albumin and a few hyaline casts and bile. Kidney function is normal; two-hour test is negative. Van den Bergh test shows positive direct reaction. Icteric index, 75. Blood Wassermann, negative. *Gall-bladder visualization:* (Sodium tetraiodophenolphthalein by mouth.) No shadow of the gall bladder seen in any film. The liver is well outlined and extends to two finger breadths above the crest of the ilium.

This case was included to ascertain the affects of the salt on a liver known to be the seat of a catarrhal inflammation. It is evident that liver function is much inhibited; and it is also of interest to note the enormous enlargement, accompanying the inflammation in the bile ducts. There was also noted a considerable quantity of the salt remaining unabsorbed in the intestinal tract. Constipation was a feature and may be expected in all cholangitis cases.

Case 9.—H. R. K., white male; age, 40; weight, 147 pounds. Admitted June 20, 1926. T. P. R., 103-90-20. *Diagnosis:* Undetermined. *Complaint:* Severe pain in the upper abdomen. *Family history:* Not important. *Habits:* Good. He is a rather heavy smoker. *Past history:* Malarial fever and "ground itch" in childhood. Indigestion in 1910. In 1917 and again in 1920 patient had an

attack similar to the present one. He has frequent attacks of indigestion. *Present illness:* Onset sudden, with severe gripping pain in the upper abdomen, with vomiting, which began at 2 a. m. (6-20-26). Pain later was confined to the right side. *Physical examination:* Well-developed and nourished white male, confined to bed; general appearance, good. Color of skin, somewhat sallow. Heart and lungs, negative. Abdomen shows no masses, but there are considerable tenderness and distention. There is distinct tenderness over the appendix area but no noticeable rigidity. Rectal examination is negative. Genitalia, extremities, and reflexes show no abnormalities. *Laboratory reports:* White blood cells, 12,400. Polys., 93 per cent. Urinalysis, sp. g., 1.029; a very faint trace of albumin. Stools are positive for occult blood. Icteric index, slightly increased. Van den Bergh test, negative. Flat film of the gall bladder shows numerous small opaque areas in the gall-bladder region, simulating multiple stones. *Gall-bladder visualization:* (Sodium tetraiodophenolphthalein by mouth.) Sixteen-hour film shows a long, narrow gall bladder, well outlined, and apparently filled with small stones. Twenty-hour film shows no change. Twenty-hour film, shadow has begun to fade out. Thirty-six hour film shows a very small amount of dye surrounding each stone. The stones are plainly visible as a large group filling the gall bladder.

This was a very beautiful demonstration of the efficacy of the visualizing salt. The flat film prior to any preparation did show evidence of stones, but, because of the unusual length and shape of the gall bladder, there was some question if it actually was the viscus which was seen. The salt immediately made the diagnosis plain and the patient was operated upon (7-13-26), appendectomy and cholecystectomy being performed. (Figs. 5-10.)

CONCLUSION

1. Nine routine cases in which cholecystography was performed are cited with fairly complete history in each case. The limited experience with the sodium tetraiodophenolphthalein and the mercuric bromine salt has convinced us that the former salt administered orally will give results adequate for correct diagnosis without any of the untoward symptoms so frequently encountered when either salt is given intravenously.

2. Two cases are illustrated. Figures 1 to 4 (case 6) show the shadow of the gall bladder in the cases which we have learned to consider normal, opacity of the shadow, and time of appearance and disappearance. Figures 5 to 10 (case 9) show the findings in a gall bladder containing 210 stones, the flat film in this case giving little indication of the existing pathology.

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THROMBO-ANGIITIS OBLITERANS*

WITH REPORT OF CASES

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Last year a paper with discussion of several cases of thrombo-angiitis obliterans was read by a member of this staff. Since that time the cases that were discussed have been rehospitalized for further treatment and several new cases have made their appearance in the hospital.

It is believed that a review of this subject and a discussion of the clinical course of the patients taken up in the other paper will be of interest.

DEFINITION

Thrombo-angiitis obliterans, also commonly called Buerger's disease, presenile spontaneous gangrene, or presenile or juvenile gangrene, but incorrectly called endarteritis obliterans, is a clinical and pathological entity, it being a chronic progressive disease affecting the extremities, the etiology of which is not as yet definitely established. It is characterized by a thrombotic occlusion, associated with an inflammation of apparently healthy arteries and veins, resulting in circulatory obstruction and great pain, making it difficult or impossible for the victim to use the affected limb or limbs, with the ultimate development of ulceration and gangrene.

ETIOLOGY

The disease is more common than is generally thought. The etiological factor is not known, and writers vary greatly in their theories regarding the causative factor, the incidence, and so forth.

That it occurs in the young individual (20 to 40 years of age), that it is essentially a disease of the male, and that syphilis has nothing to do with it have apparently been definitely established.

It is most common among Russian, Polish, Rumanian, and Galician Jews, for which reason it was called the "Jewish disease," one writer reporting 100 consecutive cases occurring in Jews, while but 4 cases out of 500 did not belong to the Semitic race. Other

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writers report its occurrence in Japanese, Swedes, Chinese, and other races.

Buerger states that in 500 cases reviewed by him only 3 were found to be females, and, as amputation was not done, there is no definite proof that they had the disease.

Nearly all of the cases are inveterate cigarette smokers, and consequently tobacco is given as the etiological factor. The progress of the disease has been inhibited by the stopping of the habit of cigarette smoking and has been lighted up again by its resumption. This fact would indicate that tobacco is a factor.

Rabinowitz has isolated organisms which apparently meet with Koch's postulates, and will possibly establish the definite etiology. The fact that the disease occurs only in the extremities, and the fact that many cases give histories which seem to link the disease to hard work, with strain on feet and legs, suggest trauma to vessels, and this, added to the hydrostatic effect of the circulation, makes the vessels of the extremities—especially the lower ones—suitable for devitalization and for blood to stagnate there, thus preparing the ground for the organism.

PATHOLOGY

The primary pathology is confined to the vascular system, manifesting itself by an inflammatory process, this being followed almost immediately by an extensive occlusive thrombosis which soon is followed by healing and organization, resulting finally in a complete closure of arteries and veins, the lumina of which have been replaced by a vascularized, canalized, connective tissue. Periarteritis, however, also occurs with the process, and thus the structures immediately surrounding the vessels are also involved. Finally, due to the complete occlusion of the vessels—including the veins—the result is a dry gangrene.

As stated in Tice's Practice of Medicine:³

Histologically the lesions may be divided into two main stages—(1) the healed or organized stage, and (2) the acute or incipient stage of thrombosis.

Healed stage.—The thrombotic tissue is seen to be composed of connective tissue with sinuses of varying sizes and shape here and there. No elastic tissue is seen except a very small amount concentrically placed about the newly formed vessels. The termination of the occluding tissues in arteries and veins is often seen in the form of a rounded, convex projection, pointing upward (cephalad) and lying in a practically healthy vessel-wall.

The acute or specific lesion.—This is characteristic, and a diagnosis is possible on the basis of examination of a portion of recently affected artery or vein. An inflammatory process involving all the coats of the vessel is apparently the early lesion. Polynuclear leukocytes are found, and the clot is red. At the periphery of the clot collections of leukocytes are found; these are fol-

³ Practice of Medicine, Tice. Vol. VI, W. F. Prior Co. Hagerstown, Md.

lowed by the appearance of foci containing giant cells, endothelial cells, or angioblasts and broken-down leukocytes. These foci undergo connective tissue replacement until only a fibrous nodule containing vessels and some pigment is left. Elsewhere the organization of the thrombosing clot is similar to that found in other conditions in which thrombosis occurs.

SYMPTOMATOLOGY AND CLINICAL COURSE

Buerger's description, as quoted in Tice's Practice, follows:

The patients complain of indefinite pains in the foot, in the calf of the leg, or in the toes, and particularly of a sense of numbness or coldness whenever the weather is unfavorable. Upon examination we see that one or both feet are markedly blanched, almost cadaveric in appearance, cold to the touch, and that neither the *dorsalis pedis* nor the posterior tibial artery pulsates. When the foot becomes warm some color gradually returns. Some patients complain of rheumatic pains in the leg; others are able to walk only a short distance before the advent of paroxysmal, shooting, cramp-like pains in the calf of the leg makes it imperative for them to stop short. Some of these cases show the typical symptoms of intermittent claudication. After months—or, in some cases, even years—have elapsed, trophic disturbances make their appearance. It is at this stage that another rather unique symptom makes its appearance—one which gives the foot the appearance typical of erythromelalgia. When the foot is in the pendant position there is a bright red blush in the toes in the anterior part of the foot. This comes on rather rapidly, extending in some cases to the ankle or slightly above. Soon a blister, hemorrhagic bleb, or ulcer develops near the tip of one of the toes, usually the big toe, frequently under the nail, and when this condition ensues the local pain becomes intense. Such trophic disturbances may at times make little progress and last for months; sometimes, however, the skin in the neighborhood shows cyanotic discoloration, and dry gangrene of the whole toe is an early issue. Even before the gangrene, at the ulcerative stage, amputation may become imperative because of the intensity of pain. The left leg is usually the first to become affected, although both limbs may show vascular disturbances almost simultaneously, and, when such is the case, the trophic changes, the ischemia, or the reddening, may give rise to a symptom complex, often diagnosed as Raynaud's disease. In brief, after longer or shorter periods, characterized by pain, coldness of feet, ischemia, intermittent claudication, and erythromelalgic symptoms, evidences of trophic disturbances appear which finally pass over into a condition of dry gangrene.

DIAGNOSIS

Due to the variable course of the disease in its early stages, it is frequently very difficult to establish a definite diagnosis without confusing it with the other vascular and neurogenic diseases of the extremities.

The following groups of symptoms, according to Buerger, are characteristic of thrombo-angiitis obliterans: (1) The disappearance of the pulses, particularly the *dorsalis pedis*, posterior tibial, and politeal; more rarely the femoral, radial, and ulnar; (2) the development of typical manifestations of impaired circulation, to wit, blanch-

ing of the lower extremities when these are elevated above horizontal, hyperemia (rubor or erythromelia) or reddening of the foot in the dependant position during certain stages of the disease, and trophic disturbances such as impaired growth of the toenails, slightly atrophic condition of the skin, ulcers, and gangrene; (3) true vasomotor phenomena of transitory nature, such as alternating syncope, rubor, coldness apparently independent of those chronic changes that have been cited above and that are distinctly traceable to the occluded condition of the arteries and veins; (4) the symptoms of pain, either in the form of intermittent claudication (pain in the calf of the leg or in the foot on walking, with cessation when the limb is at rest) or the severe pain that is associated with the advent of trophic disturbances, especially with ulcers and patches of gangrene; (5) the slow course of the disease, symptoms of intermittent claudication or pain, preceding the development of trophic disturbances for months and years; (6) the fact that about 99 per cent of the cases occur in Polish, Galician, or Russian Hebrews, and that almost always young males between the ages of 20 and 30 are taken with this disease; (7) the onset of symptoms in the lower extremities, one of the legs being first affected; (8) the comparative infrequency of involvement of the upper extremities; (9) the association of a peculiar type of migrating phlebitis in the territory of the external or internal saphenous, less frequently in the larger veins of the upper extremities, characteristic in about 20 per cent of the cases; (10) the slow but steadily progressive course, leading, in a large majority of the cases, to amputation of at least one limb, not infrequently of both lower extremities, and in rarer instances to amputation of one of the upper extremities as well.

For the clinical diagnosis of thrombo-angiitis we must depend upon (1) the racial (Hebrew) and sex (male) predilection; (2) the early involvement of the lower extremities; (3) the early symptoms of pain or intermittent claudication; (4) the presence of migrating phlebitis; (5) the evidence of pulseless vessels; (6) the presence of blanching of the extremity in the elevated position; (7) the existence of rubor in the dependent position; (8) the relation of the hyperemic phenomena to posture; (9) the absence of simultaneous, symmetrical involvement; and (10) the slow, progressive, chronic course, terminating in gangrene.

DIFFERENTIAL DIAGNOSIS

In the differential diagnosis one must consider Raynaud's disease, scleroderma, sclerodactylia, syphilis, tuberculosis, diabetes, arteriosclerosis, and erythromelalgia.

Raynaud's disease is a disease of unknown etiology, and its pathology is not exactly known. There is alternating blushing and blanch-

ing of the foot. This disease is characterized by sudden onset, intermittent attacks with normal intervals. The pain has always a distinct nerve distribution and usually is symmetrical, and there is always atrophy in the phalanges, and the disease is more frequent in upper extremities and is also found in the ears and tip of nose.

Scleroderma and sclerodactylia always reveal a first stage of hard edema, atrophy of distal phalanges, and early X-ray changes.

In syphilis there are a positive Wassermann reaction and other signs of syphilis.

Tuberculosis of skin in its early stages is somewhat confusing, but in the later stages it is not so difficult. Foci in the lungs and elsewhere are also found.

Diabetes can usually be differentiated by history and laboratory findings.

Arteriosclerosis occurs usually in older people, is palpable, and a high blood pressure is usually present.

In erythromelalgia the plantar surface of the foot is red and glistening, while the rest of the foot is pale and atrophic, arterial pulsation is bounding, temporary swelling is present, the rubor is paroxysmal, and it is equal in both sexes.

PROGNOSIS

Many of the cases end in the loss of a limb or limbs. Occasionally infectious, spreading gangrene may set in, resulting in death. A great many cases are comparatively free from distressing symptoms for periods of many months or years and enjoy fair health and comfort. However, due to the unsatisfactory methods of known treatment, one might say that the prognosis is grave in most cases.

TREATMENT

The treatment of this distressing condition is at its best very unsatisfactory. Many therapeutic measures have been advocated by various authors, but the majority of them soon fall into the discard. The relief offered and the supposed checking of the disease process by the various methods practiced are no doubt due in the majority of cases to the natural remissions seen, even if no treatment be instituted.

Early recognition of the disease aids greatly in the prophylactic treatment. The prophylactic means that are of value consist of bed rest, elevation of the parts, attempts to improve the collateral circulation by means of massage, heat, diathermy, passive exercises, and prevention of infection. Smoking should also be strictly forbidden.

Conservative measures to be tried are intravenous injection of Ringer's solution and sodium citrate to diminish the viscosity of

the blood. This sounds logical but does not always prove effective, for the amount of solution that can be given this way is limited. Meyer advocates flushing the gastrointestinal tract with 8 to 10 quarts of Ringer's solution daily through a duodenal tube. Other means sometimes attempted are Bier's hyperemic suction and autogenous vaccine injection.

For the alleviation of the terrific pain and of infection purely symptomatic means must be resorted to.

Surgery must be resorted to in the great majority of the cases, but the conservative means should always be given a fair trial. Amputation is practically the only procedure that seems logical, the site being determined by the palpable degree of the occlusion of the vessels.

Arteriovenous anastomosis seems rather irrational, for the veins as well as the arteries become occluded. The fallacy of femoral vein ligation also seems quite evident if we realize that the stagnation of venous blood predisposes to more thrombosis. The exposure of nerve trunks followed by injection of absolute alcohol does relieve the pain, but it is limited in its application and only predisposes to secondary infection.

CASE REPORTS

Case 1.—S. B. C. Born in America, of Anglo-Saxon parentage; 46 years of age; a farmer by occupation; was admitted to this hospital August 14, 1924, complaining of shooting pains in both hands and forearms, especially after walking and at night. These pains were first noticed in the early spring of 1924, and have been growing steadily more severe. The family history was negative.

Past and personal history.—The patient had the usual diseases of childhood. Pneumonia at the age of 19, with subsequent empyema. Typhoid at 19. The patient has had five operations for gangrene of the lower extremity. The history of these operations and their cause is well described by the patient:

"After being discharged from the United States Marine Corps in 1916 the first I noticed of trouble with my feet was that it was impossible for me to keep them warm after the weather became cold. In the summer of 1917 they gave me trouble in walking on account of both feet being swollen and tender. In the early fall of 1917 I had an infection in the great toe of the right foot. The nail was removed and the toe lanced in three places. The wounds healed, but the toe continued to give me pain at intervals. It became necessary for me to warm my feet over a kerosene lamp, even during the summer. The spring of 1921 the pain became so severe in my feet that I could not stand it, and my doctor removed the nail of the great toe on my left foot. But the pain became worse and the toe was amputated. In May that year I was taken to the hospital and left leg was taken off below the knee; 10 days later it was found necessary to take it off above the knee. I left the hospital in June, but with blisters on the ball of all the toes on my right foot but one. In August I again returned to the hospital and had the right leg taken off below the knee, and in 23 days it was found necessary to amputate again above the

knee to get ahead of the gangrene. The pains I now have in my hands are exactly like the pain I had in my feet before the gangrene set in."

This patient's general health has always been good and he has lived a life of regular habits and hard work. There is no luetic history. Physical examination shows a well-developed, white male, 46 years of age. The entire physical examination is essentially negative except the extremities.

The right leg has been amputated about 8 inches below the hip, left leg 10 inches below the hip. The scars are pliable and the stumps are in excellent condition.

The skin of both arms is dry and scaly. There is a slight amount of atrophy of the right hand, marked about the hypothenar eminence. The right fifth finger has been amputated. The terminal phalanx of the index finger of the right hand shows a trophic disorder; the skin is peeling off and the finger is shrunken. At times the finger becomes very sensitive. The entire right hand looks bloodless and is markedly colder than the left. There is no radial pulse on this side. The superficial veins of the right forearm are small and are not visibly increased in size by the application of tourniquet. The left hand and forearm are objectively normal, but the patient complained of some pain in the left hand when he entered this hospital. Blood pressure is: Systolic, 120; diastolic, 80. The blood picture is normal. Urine normal. Wassermann (blood), negative.

Under physiotherapy, consisting of massage and radiant heat, there has been a marked lessening of the pain in the left hand, but no change whatever in the right.

Since the above report was made the patient has been readmitted to the hospital twice and the course of the disease has been as follows:

The index finger continued to grow worse and was amputated March 31, 1925, at proximal phalanx. The stump did not heal, so reamputation had to be done, removing a portion of metacarpal bone.

The fourth finger followed a similar course and had to be amputated at the proximal phalanx.

At present the middle finger is cold, joints are voluntarily immovable, and the finger shows vascular changes.

Patient has noted no changes or symptoms in his thumb.

The left index finger at present is showing subjective changes, and patient states nail is much harder to cut and skin at tip is coming off. The other fingers of this hand have apparently been giving no symptoms of late.

Case 2.—E. T. Canadian; 37 years of age. Entered hospital June 7, 1924, complaining of pain, discoloration, and swelling in left foot. These symptoms were first noticed in 1918, when the foot was frostbitten.

Soon after the symptoms left, to return in 1919 and again in 1920. Since 1920 the patient has been bothered with pain in this foot and frequent swelling up to twice its normal size. The foot gets cold easily and, even on warm days, the patient is forced to wear two pairs of socks on it. The pain is more severe after he has been on his feet for some time and at night. On walking for any considerable distance the patient has typical symptoms of intermittent claudication. The past, personal, and family histories are entirely negative. The man is a lumberman by occupation and has lived an outdoor life of vigorous work and regular habits. He is well developed and well nourished. Careful physical examination fails to reveal any pathology whatever except in

the affected extremity. This, the left foot, is swollen about 30 per cent and pits on pressure. Foot is cold and of a dusky-red color. The coldness and discolorization extend to just above the ankle; the line of demarcation is sharp and definite. There is marked tenderness of the entire great toe and of the fifth toe—more marked on the plantar surface. The pulse of the *dorsalis pedis* and posterior tibial arteries is not palpable. Reflexes are present but sluggish. There is no active movement of the great and fifth toe, and the movement of the other toes is markedly limited. The Wassermann reaction is negative. Blood and urine are normal. X-ray examination of the foot shows no evidence of arteriosclerosis.

The condition did not improve with physiotherapy, and the patient became weak and nervous from the almost constant pain and loss of sleep.

On July 22, 1924, the great toe was amputated at the metatarsophalangeal joint. There was some venous bleeding, but no arterial bleeding. Prognosis for cure not considered good. Pathological report of amputated toe was as follows: Gross: Great toe, with longitudinal incision on the plantar surface. Immediately under the nail there is a discolored area, apparently necrotic, about 2 by 2 centimeters. Microscopic: The walls of the smaller arteries and veins are greatly thickened. There is especially a proliferation of the intima. In some places cells of an embryonal type completely occlude the lumen.

Following operation, the pain was less for several days. The wounds did not heal, however, the pain returned, and on August 7, 1924, the extremity was amputated about 1 inch above the middle of the tibia.

The stump became infected with a low-grade staphylococcus infection and continued to discharge for several months, later requiring curettage. Patient was discharged from hospital on May 4, 1925.

Patient was readmitted to hospital on June 3, 1925, with complaints of redness, pain, and swelling in right middle finger and also swelling at the wrist. Physical examination of the member revealed the finger to be reddened, tender, and cold to the touch. Radial pulse absent. He also complained of pains in right foot, but no objective findings were present. Condition relieved by physiotherapeutic measures and he was discharged for out-patient treatment on July 23, 1925.

On October 23, 1925, patient was again admitted to the hospital complaining of paroxysmal throbbing, pulsating pain in right hand, discoloration of middle finger, these symptoms having been much more severe during the past six weeks. Physical examination of right hand revealed a beginning dry gangrene of the middle finger, coldness and tenderness of the other fingers, and absent radial pulse.

The condition of the middle finger gradually became worse, and on November 6 the finger was amputated at the metacarpophalangeal joint; satisfactory, but slow, healing occurring after about six weeks.

The tip of the ring finger became progressively more painful and discolored, and on several occasions dry gangrene started, but active physiotherapeutic measures held the process in check, and the patient was discharged from the hospital on February 19, 1926.

Case 3.—W. H., Irish-American, 30 years of age, sheet-metal worker, was admitted to the hospital on January 12, 1926, complaining of pains, cramplike and shooting in character, in his left calf, present at irregular intervals for the past six years but almost constant during the past two years.

These pains were brought on after walking a few blocks, compelling him to stop (intermittent claudication). About four months ago he noted a peculiar reddish-blue discoloration in his toes and part way up the dorsum of his foot when foot is in the dependent position. About two weeks ago he noted a discharge of puslike material from beneath the nail on the great toe, and nail seems somewhat loosened. The foot also is prone to sweating, feels cold, and is more painful in cold weather.

Past history reveals chancroid in 1918, pneumonia in 1918, and skull fracture in childhood.

Family history is negative.

Physical examination is negative except for several bad teeth, and condition of foot, which reveals discharge from beneath great-toe nail, coloration, rubor, and blanching characteristics of thrombo-angitis obliterans, and arterial findings of absent *dorsalis pedis* and weak posterior tibial and popliteal pulses, Wassermann reaction repeatedly negative, except for one occasion, when Kahn was 1 plus.

After three weeks the foot shows considerable improvement after postural, physiotherapeutic, and hot saline bath treatments.

Phlebitis of superficial veins on inner surface of the leg has developed, and this at present is very painful.

The history and physical findings in this patient are quite typical of the disease and, although the process at present seems to be slightly improving, the outcome will undoubtedly be amputation.

Case 4.—M. R., Russian Jew by birth, 32 years of age, peddler by trade, was admitted to the hospital on October 19, 1925, with complaint of sore on lower right leg for past eight months.

History of trouble with foot dates back to 1918, when he froze right foot in army. From this time to 1922 he had vague disturbances in his foot. In 1922 he began to have severe pains, intermittent claudication, and discoloration of toes of foot—worse in winter months. About eight months ago he noticed a blister on lower portion of leg, this becoming gradually worse even though he has received treatment from outside doctors.

Family history, negative. Past history, measles and scarlet fever in childhood, influenza overseas. Herniotomy, 1917. Moderate user of alcohol; heavy user of tobacco.

Physical examination reveals nothing extraordinary except that which is complained of. Granulating ulcer, 4 centimeters in diameter, on right lower leg. Entire foot and ankle is discolored. Impaired pulsation of *tibialis posterior* and *dorsalis pedis*. Laboratory examinations negative. X ray reveals slight bony erosion of tip of right fibula.

On October 23, 1925, a sequestrotomy was performed on lower end of right fibula. Pathological section revealed chronic inflammation. The ulcer slowly improved but did not heal. Patient continued to complain of much pain, and foot showed no improvement.

Amputation of right leg was performed 3 inches below tibial tuberosities on January 13, 1926. No arterial and very little venous bleeding occurred.

Patient seen by Doctor Buerger, who stated that it was a typical case of thrombo-angitis obliterans.

Pathological sections of vessels were also found to be typical of the disease.

Now, on April 1, 1926, the stump is practically healed and there is no evidence of the condition in any of the other extremities.

THE DEBT OF SURGICAL DIAGNOSIS TO THE X RAY

By G. F. COTTLE, Commander, Medical Corps, United States Navy

When the X ray first demonstrated its ability to show with exactness the line of a fracture in long bones, it was not realized how extensive was to become the use of this diagnostic method in the entire field of medical and surgical diagnosis. Symptoms pointing vaguely toward a certain organ or part of the body are now quickly and definitely clarified by shadow or silhouette of the part on an X-ray plate. Hidden pathology is revealed and recorded in most convincing fashion. Merely to list some of the many conditions made visible by the X ray shows in a striking manner how great is the debt that surgical diagnosis owes to this wonderful aid.

OUTLINE OF USES OF X RAY IN DIAGNOSIS

Foreign bodies swallowed into the esophagus, inhaled into the bronchi, ingested in the intestinal canal, inserted in the normal openings of the body, such as the nose, ear, urethra, and bladder, if of sufficient X-ray capacity, are not only visualized but accurately located. In this class also are foreign bodies penetrating or lodged in any of the tissues, and stones in the kidneys, ureters, or bladder, stones in the gall bladder, pancreas, etc.

Bones are seen with great distinctness. Fracture lines of all kinds; and of special value is it in those fractures which are not easy of exact study by the older clinical methods of examination, such as fracture of the skull, the scapula, the pelvis, the spine, the hip joint, the small bones of the wrist and foot. Malignant and benign tumor of the bone, including metastatic tumors, show with great distinctness. Bone cysts, atrophies, dystrophies, deformities, abnormalities, congenital and acquired; bone diseases, osteomyelitis, periostitis, sequestra, gummata, osteomalacia, rickets, rheumatoid changes, all are visualized.

Joints show dislocations, subluxations, joint fractures, fracture sprains, torn cartilage, joint mice, calcified ligaments, and periarticular bursæ. Irregularities of joint outline suggest arthritis, perichondritis, ankylosis, abnormal fluid joint contents.

The chest wall is clearly seen so that changes in its bony structure are visible; cervical ribs, absent ribs, floating ribs, dorsal Pott's disease, scoliosis.

In the lungs the X ray demonstrates tuberculosis in its many forms; incipient, cavity formation, consolidation, thickened pleura, enlarged hilum lymph nodes. Broncho and lobar pneumonia, bronchiectasis, lung abscess, massive collapse of the lung, metastatic

cancer, important to diagnose accurately postoperative as well as anteoperative. All these are clearly demonstrated by the X ray.

The pleura is visualized when thickened or distorted. Pleuritic adhesions, hydro-, pneumo-, and pyo-thorax are shown when present.

The heart is seen in motion. Its size, position, and even the relative size of its auricles and ventricles are made out.

The pericardium when diseased will show a shadow indicative of adhesions or of abnormal effusion or exudate.

The mediastinal contents are shadowed forth; aortitis, thoracic aneurysm, substernal goiter, persistent thymus, the thoracic enlargements of Hodgkin's disease, and occasionally vague shadows indicative of mediastinitis or of purulent collections in these deeply placed areas.

The diaphragm can be seen in outline; high, low, or irregular, so that diaphragmatic hernia, diaphragmatic pleurisy, subphrenic abscess, may be diagnosed or such diagnosis sustained.

The solid viscera—liver, kidneys, spleen—are frequently outlined, so that cirrhosis of the liver, liver abscess, splenomegaly, and surgical disease of the kidney may be visualized.

The gastrointestinal tract from mouth to anus is easily studied following the ingestion of the opaque meal of barium. In this manner the esophagus, stomach, small and large intestines, are seen and seen in action. Motility, barium retention, stricture, spasm, atony, abnormalities of position, shape, and size, malformations, congenital anomalies, ulcers of duodenum or stomach, diverticulæ, tumors, benign and malignant, peritoneal adhesions, all are seen.

The gall bladder, when normal, may now be seen after ingestion of sodium tetraiodophenolphthalein and its emptying time determined. In this way irregularities of outline and failures to show on the X-ray plate are being taken to indicate cholecystitis. Gallstones not otherwise seen are occasionally demonstrated by this new technique.

The pyelogram, ureterogram, and cystogram, obtained after the injection of sodium iodide through the urethral catheter, have given a definiteness to the diagnosis of surgical disease of the kidney that had been impossible for the specialty of urology before this X-ray assistance was obtainable.

Sinuses and fistulæ, when injected with material opaque to the X ray, are seen, so that their extent, ramifications, and type may be better shown before operation.

Lipiodol injections into the bronchi are becoming of increasing value in certain lung conditions, especially lung abscess and bronchiectasis, and quite recently the injection of this substance into the spinal canal has located with exactness the level of spinal-cord tumors.

Gas or air in the tissues or in the viscera of the body is readily shown in the X-ray plate. In the pleura, in the peritoneum, in joints, in the uterus, in the fallopian tubes, air or gas, injected or otherwise present, will often, when studied on the X-ray plate, suggest or reveal the pathology present.

Gas not normally present in the tissues may when found mean an infection by the gas bacillus. In certain forms of acute disease or traumatism gas or air may be seen as a localized emphysema or as gas in a cavity where it is not normally present—the peritoneum, pleura, and elsewhere. In this manner a ruptured duodenal ulcer or a penetrating wound of the chest or of the intestine may be proved present, or the X-ray picture may be of great assistance in confirming the clinical picture. Air injected into the ventricle of the brain and studied by the X-ray plate is used to localize brain tumors. The air in the accessory air sinuses permits a clear-cut X-ray picture of the sinuses. In disease this clear picture is disturbed. In this manner the presence of mastoiditis or of sinusitis of the frontal, ethmoid, sphenoid, or maxillary sinuses is demonstrated.

While the above outline is not complete or inclusive of all that the X ray has done for diagnosis, its recital, even though imperfect, makes the X-ray plate and the fluroscope stand forth as indispensable and most valuable diagnostic aids.

Three cases recently treated aboard the U. S. S. *Relief* illustrate the value of the X ray in emergency surgery.

CASE REPORTS

CASE 1.—*Gas gangrene (B. Welchii)*; X-ray picture of gas in tissues of foot.—T. A. M., sea. 2 c., U. S. Navy, case No. 9613, 22 years of age, weight 143 pounds, white, male, was, on April 2, 1926, run over by a trolley car ashore. He sustained severe crushing injuries of both feet. In a civilian hospital the left leg was amputated near the middle of the lower leg. On April 5, about 36 hours after the original injury, he was brought to the U. S. S. *Relief* with the history that his pulse had been 130 the preceding evening. Immediately on arrival, while en route to the ward, an X-ray picture was taken of the amputation stump and of the crushed right foot and leg. The patient looked pale, the pulse was 120, and temperature 102. Upon removing the dressings the crushed foot was found to be gangrenous, and from it there exuded a thin, brown-colored discharge with a fetid odor, that of decaying flesh.

The X-ray picture (fig. 1), received in the ward by the time the dressings were removed, showed gas bubbles in the crushed and gangrenous foot. The pulse of 130, the pallid, toxic appearance of the patient, and the X-ray picture of gas in the tissues made the diagnosis of gas gangrene and decided the need for immediate radical surgery. Amputation of this leg at the junction of the upper and middle third of the tibia and fibula was done. Smears and culture were positive for *Bacillus aerogenes capsulatus (B. Welchii)*. The stump was left open and dakinized. For a few days the infection with this bacillus persisted in the stump, but it gradually disappeared. The patient is now on the way to recovery from the infection.

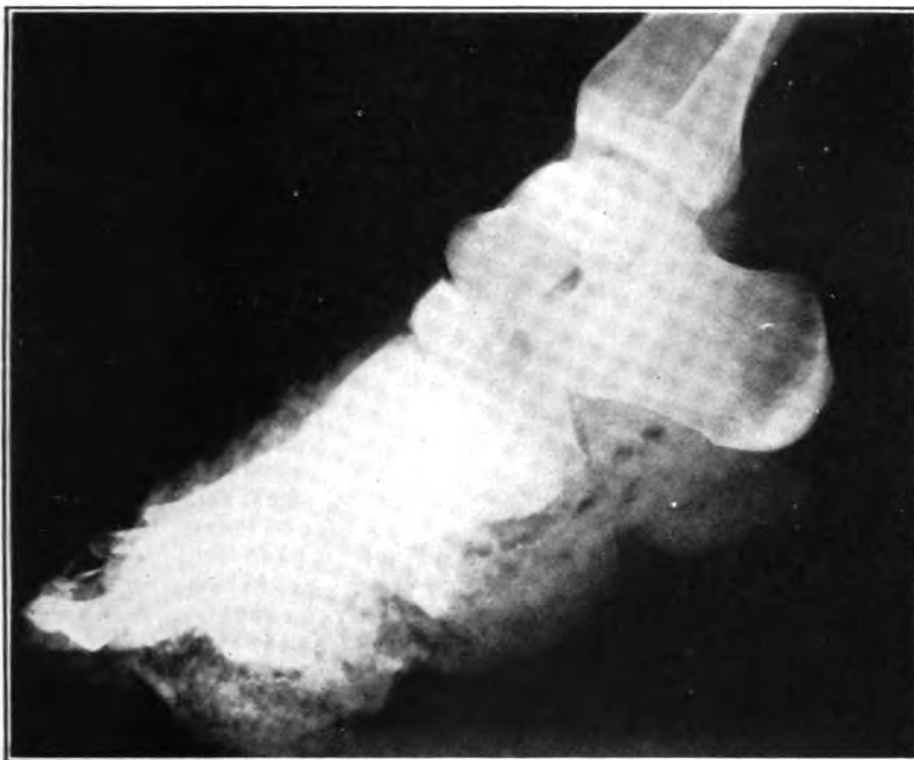


FIG. 1.—GAS IN TISSUES OF FOOT. *B. WELCHII* INFECTION



FIG. 3.—GAS BETWEEN LIVER AND DIAPHRAGM, DUE TO PERFORATED
DUODENAL ULCER

616-1

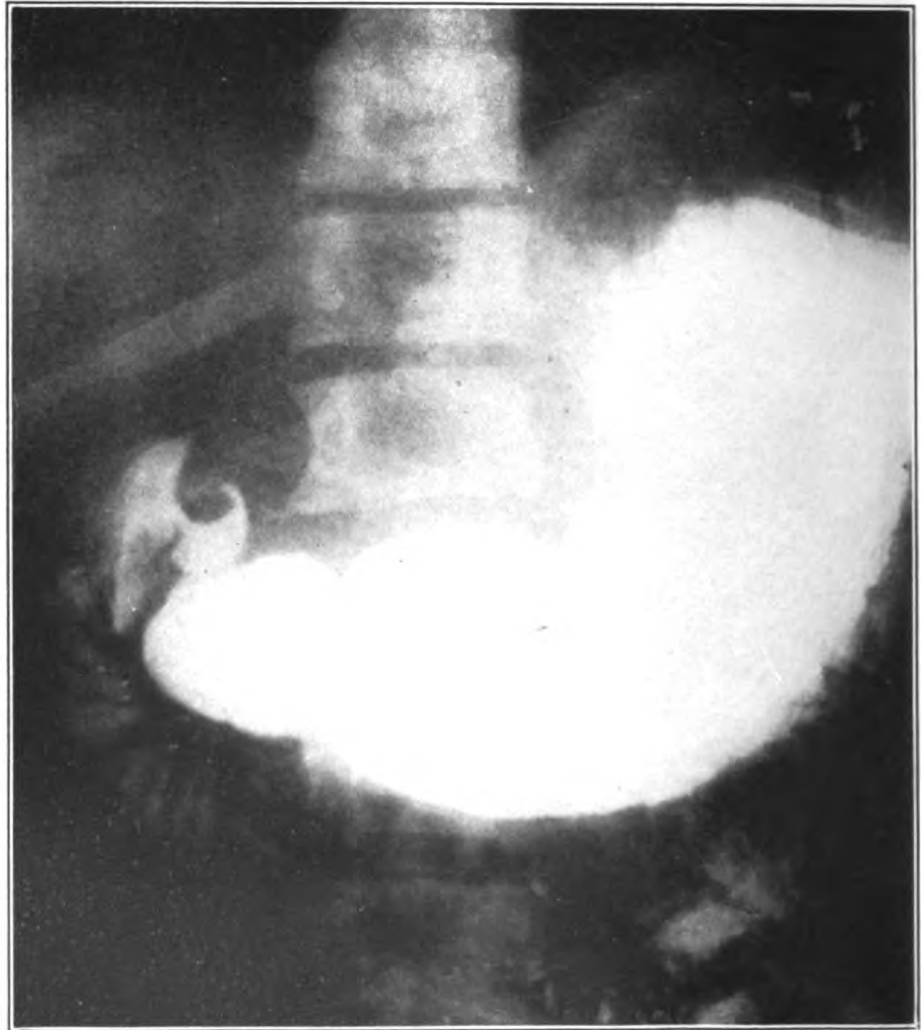


FIG 2.--BUTTERFLY DEFORMITY OF DUODENAL ULCER

61C-2

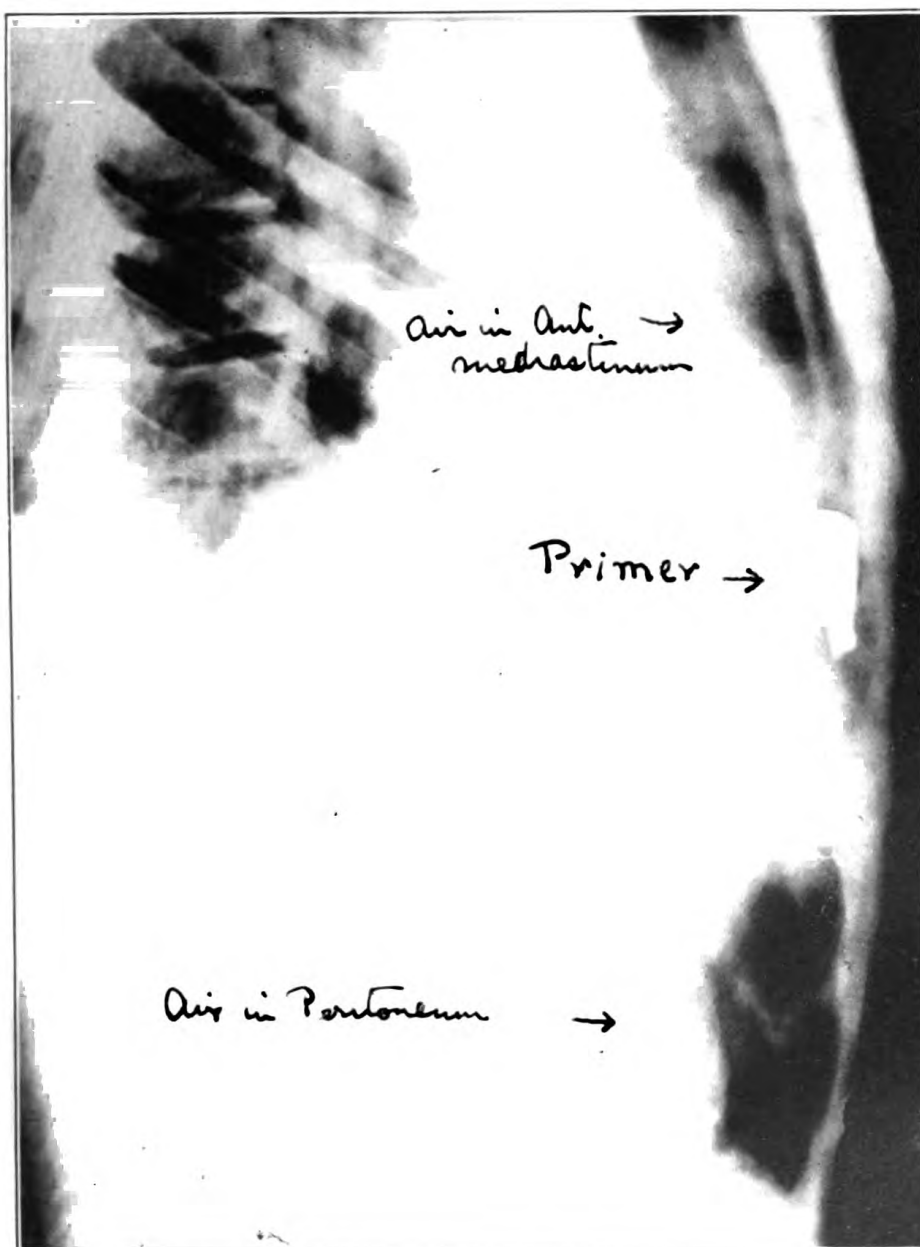


FIG. 4.—AIR OR GAS IN ANTERIOR MEDIASTINUM AND PERITONEUM

616—3



616-4

FIG. 5.—AIR OR GAS IN PERITONEUM

Discussion.—So serious is the decision to amputate, and especially when one leg has already been removed, that the surgeon is grateful for any assistance in reaching this important decision. In this case the deciding factor was the X-ray plate. Gas gangrene is rare in civil or peace-time military practice and is one of the most serious of the surgical toxemias. The earlier the diagnosis the less mutilating may the operation be made and the better chance there is for saving life. In the X ray we have the means of an early diagnosis. In this case the X-ray plate sustained the diagnosis and made a permanent record of the need for the mutilating operation within a few moments of the patient's arrival and even before the inspection of the foot could be completed.

CASE 2.—Perforated duodenal ulcer; X-ray picture of gas in peritoneum.—J. F., Sea. 2 c., U. S. Navy, case 9665; 19 years of age; weight 125 pounds; white male.—First admitted to the sick list November 23, 1925, for severe abdominal cramps and epigastric pain, with previous history of similar though less severe pain in upper abdomen coming on two or three hours after each meal. A diagnosis of duodenal ulcer was made and the diagnosis confirmed by X-ray plates which showed a constant filling defect, butterfly deformity in the first portion of the duodenum (fig. 2), and, in the six-hour plate, barium retention at the ulcer site.

Sippy diet brought about complete disappearance of symptoms and patient was transferred to the naval hospital, Mare Island, and later returned to duty aboard ship, symptom free. He remained entirely well until April 10, 1926, when, at 5.30 a. m., he was awakened by a sudden, severe cramp in the upper abdomen. At 9 a. m. the pain returned and he vomited. The abdomen was found to be tense and the pulse 110. At 11 a. m., when he reached the U. S. S. *Relief*, six and one-half hours after the onset of the pain, he was found to be in moderate shock, face pale and anxious, abdomen of board-like hardness and very tender in the epigastrium. Before putting him in bed he was taken to the X-ray room and the X-ray plate (fig. 3) showed gas between the liver and the diaphragm, present in all positions, though liver dullness was not absent on physical examination. The leucocyte count of 24,450, neutrophils 85 per cent, temperature 99, and pulse 96 completed the classic picture of acute abdomen due to ruptured duodenal ulcer. Operation found this condition to be the cause of the symptoms.

Discussion.—Three of these cases of ruptured duodenal ulcer have been operated upon by the surgical staff of the U. S. S. *Relief* since October 1, 1925, and one postoperative case has been received from the U. S. S. *West Virginia*, where it was operated upon by Lieutenant Commander Shepard (M. C.), United States Navy. All four recovered from their acute condition. The credit for the recovery of these cases belongs to the medical officers of the ships upon which these men were serving at the time of onset of their symptoms. All were operated upon well within the period of 12 hours after onset, and the diagnostic work and speed with which they were brought to operation is a tribute to the alertness and diagnostic acumen of

the medical officers aboard those ships. In this case the X-ray findings are, it is believed, of sufficient interest to report as an illustration of how the X ray may demonstrate the presence of gas in the peritoneum when the symptom of absent liver dullness is not obtainable by percussion.

CASE 3.—Foreign body (primer) penetrating chest and abdomen; X-ray picture of air in the peritoneum and mediastinum.—H. D. G., sea., 2 c., U. S. Navy, case 8744, age 21, weight 160 pounds, white, male, admitted on U. S. S. *Relief*, November 13, 1925. While acting as rammer on a 5-inch gun aboard his ship at target practice a premature discharge of the primer occurred. He felt a blow in the chest but kept on working for three hours after the accident. A search was made for the primer but it could not be found. After three hours the man became faint and vomited, and it was then discovered that he had a wound in the chest, left side, ninth intercostal space, about 3 inches from the sternum. He was sent to the U. S. S. *Relief*, where an X-ray picture disclosed the primer, an oblique, metallic, foreign body, $5\frac{1}{2}$ centimeters long, lying obliquely immediately beneath the ensiform cartilage. The X-ray plate also showed that there was extensive pneumoperitoneum and air or gas in the anterior mediastinum, but none in the pleural cavity (figs. 4 and 5). Expectant treatment was instituted, and as the hospital ship shortly thereafter went to the navy yard for overhaul the operative removal was done at the United States naval hospital, Mare Island. At operation the primer was successfully removed. Physical examination at the time of injury showed no evidence of hemo- or pneumo-thorax, but the record states that the admitting surgeon found abdominal distension present.

Discussion.—To the staff of the U. S. S. *Relief* this X-ray picture of pneumoperitoneum and of gas or air in the anterior mediastinum was interesting, and it is therefore presented in this series of cases illustrative of the great value of X ray in the diagnosis of emergency cases. It is believed the missile entered above the diaphragm, traversed the diaphragm close to its costosternal attachments, and lodged just within the peritoneal cavity at its upper anterior limit near the ensiform cartilage.

The air or gas demonstrated in the X-ray plate probably entered with the missile and escaped from its track into both the anterior mediastinum and the peritoneum, where the primer entered both these areas.

The röntgenologist of the U. S. S. *Relief* has so organized his department that it is ready at any hour in the 24 and at any day in the week to take X-ray pictures and to develop them for the immediate inspection of the surgeon if the emergency seems to indicate the need. These three cases illustrate the value of this type of service. I am indebted to the röntgenologist, Lieut. O. B. Spalding (M. C.), United States Navy whose staff not only took the X-ray pictures but also prepared for this article the accompanying photographs of the work done.

THE TREATMENT OF CHANCROIDS AND OTHER LESIONS WITH AMMONIACAL SILVER NITRATE AND FORMALIN

By P. G. WHITE, Commander, Dental Corps, and Lieut. (Junior Grade) J. Q. OWSLEY, Medical Corps, United States Navy

Various and sundry methods for treating the lesion of chancroid have cropped up from year to year; yet, taken as a whole, have failed to give the desired result—that is, the shortening of the time of treatment and return of the patient to duty. Therefore, any treatment which will with one application destroy the organisms producing the lesion and leave the base of the ulcer absolutely clean should be of interest to all who are called upon to treat this very stubborn and resistive infection.

The mere mention of silver nitrate conveys the impression at once that a caustic silver nitrate is implied. Before starting such treatment this error must be made clear. For years ammoniacal silver nitrate and formalin has been used with more or less success (according to the technique followed and proper understanding of the solutions) by dental surgeons in the treatment of dental disease. It occurred to one of the writers that this solution, if properly applied to the soft tissues in other parts of the body, might give the same good results. With the cooperation of Doctor Owsley, 25 cases of chancroid were treated at the Norfolk Naval Hospital and in every case remarkable results were obtained, the average length of time required for complete healing being from 10 to 15 days as against from 1 month to 3 months under other methods of treatment.

Before delving into the technique of the applications a description of the solutions is imperative. These we will term solutions (a), (b), and (c).

Solution (a) is a saturated solution of silver nitrate crystals in 28 per cent ammonia. These two ingredients, when this solution is in balance, form a new compound known as ammoniacal silver nitrate. Silver nitrate loses its caustic properties and ammonia its irritating qualities and pungent odor. A neutral compound is formed which is harmless, but the silver has not lost its sensitiveness. For instance, if a saturated solution of silver nitrate were dropped on the skin it would act as a powerful caustic and destroy healthy tissue. If one were to get a whiff of the ammonia it would prove irritating to the nostrils. Ammoniacal silver nitrate, if dropped on the skin, is harmless, only the dead epithelium of the surface being destroyed. Bacteria are the media which carry the silver solution. Bacteria soak it up as a sponge does water and time is the factor which governs penetration. Ammoniacal silver nitrate not only penetrates to the depth of bacterial invasion but is carried to the depth of bacterial influence. While the silver solution possesses certain

germicidal value, it is used in this method on account of its sensitiveness and powerful affinity for bacteria. It is selective, for whenever it comes in contact with sound tissues it coagulates healthy albumen, and wherever albumen has been digested or destroyed by bacteria the silver solution is taken up, not entering healthy tissues. It is truly self-limiting.

Solution (*b*) is 25 per cent formalin. This has a great affinity for ammoniacal silver nitrate, and wherever the silver penetrates the formalin follows, reducing the silver solution and destroying germs of all descriptions; nothing lives in this medium. During this process metallic silver in its purest form is reduced, completely walling off subsequent bacterial invasion, because metallic silver has the ability permanently to resist the action of bacteria. A strong prejudice exists in regard to the use of formalin on account of its irritating properties. But when it is taken up to a point of balance, or a point of saturation by the silver, a new compound is formed, and formalin is completely eliminated by the same process by which ammonia is eliminated in the ammoniacal silver nitrate solution. Its importance lies in the fact that a 1 per cent solution of formalin kills pure cultures of pathogenic bacteria in one hour.

Solution (*c*) is pure oil of eugenol, United States Pharmacopœia. The technique used is as follows: Wash the infected area and surrounding tissues. With a pair of cotton pliers and a pledget of cotton dipped in repelac, or any colloidal preparation, paint the outer margins of the chancroid. This is done to prevent the solution from escaping to the surrounding healthy tissue. With a glass applicator tube, now apply solution (*a*) to the crater of the chancroid, completely covering all the tissue infected. Allow to penetrate for five minutes. This usually causes a sharp sting, but not so severe that the patient can not stand it. Solution (*b*) is then applied in the same manner and allowed to penetrate or follow the silver for five minutes. The excess solution is then absorbed with bibulous paper strips touched to the crater and the silver solution again applied for one minute. This time solution (*c*) is applied, which also reduces the silver and, in turn, usually relieves all stinging sensation that may remain. The treatment is now complete, and only a dusting powder of calomel, or calomel and boric acid, equal parts, two or three times daily, with instructions to the patient as to keeping the parts free from urine, etc., is indicated. It is surprising how quickly, after the eradication of all infecting organisms, granulation takes place.

A case of poison ivy has recently been treated by applying the ammoniacal silver nitrate directly to the rash and not reducing it with formalin. The areas, of course, turned black the next day and

the discoloration was removed by the bleaching solution. In less than a week the entire rash had disappeared.

An officer on the U. S. S. *Pittsburgh* had been bothered with an eczematous condition on the back of his hand between the thumb and forefinger which had persisted, despite all kinds of treatment, for over three months. He was continually picking it with his finger nails because of the irritation, and often bleeding fissures developed. One application of ammoniacal silver nitrate solution stopped the itching, and in seven or eight days he was well.

The so-called tropical or dhobie itch, in the case of two officers in whom the infection had settled between the toes, was completely eradicated after one application.

In conclusion we wish to state that although these solutions can be made in the dispensaries of ships or stations, it is very seldom that a balanced solution can be obtained. Full equipment packages, as put up by the manufacturer, containing applicator tubes, dispensing dishes, and ampules can be obtained from the medical supply depot, Brooklyn, N. Y.

A SUMMARY OF 70 CASES OF GONOCOCCUS INFECTION TREATED WITH MERCUROCHROME-220 SOLUBLE TOGETHER WITH SUGAR AND FOREIGN PROTEIN

By L. H. WILLIAMS, Lieutenant Commander, and W. D. SMALL, Lieutenant, Medical Corps,
United States Navy

Shortly after the publication of the results obtained by Potter and Redewill (1) in treating gonorrheal infections with mercurochrome, sugar, and milk it was decided to run a similar series of cases at this hospital. The technique outlined by Potter and Redewill was closely followed. The mercurochrome-220 soluble was given as a 1 per cent solution in 50 per cent glucose in 10 mil doses, intravenously. For the foreign protein ordinary evaporated canned milk was diluted with an equal amount of water, and glucose and lactose were added in the proportion of 50 grams of each to 500 mls of the diluted milk. The original technique of Potter and Redewill calls for fresh cow's milk in addition to the canned milk, but on account of the inability to secure the former ingredient at this station, the straight canned milk was used. This modification of the technique, however, apparently produced no change in the results. Five mls of the milk and sugar solution were given in the buttocks coincidentally with the mercurochrome.

All patients were admitted to the hospital for the initial part of the treatment, were carefully examined and charted, and were given three or four doses of mercurochrome and milk, administrations being given every 48 hours. The patients were then discharged

to regular duty and received routine local treatment at organization dispensaries. This consisted of urethral injections of one-half per cent protargol three times daily. They were returned to the hospitals as out-patients for additional mercurochrome when necessary. Of the 70 cases, only 16 were given such out-patient treatment. Accurate records were kept throughout the course of the disease, attention being directed particularly to follow-up examinations of patients after their return to duty. A case was considered as cured when three consecutive negative prostatic smears and urine sediments were obtained, each two weeks apart.

The results obtained were most gratifying, and tend to show that this method of treatment is of considerable value in shortening the course of the disease, decreasing sick days, preventing complications, and alleviating the crippling effects of these complications when they do occur. One of the most striking points observed in this series of cases was the early and complete subsidence of distressing subjective symptoms following administration of the mercurochrome and milk.

The tabulation which follows shows the types of cases treated, together with the numbers and percentages of each type:

	Number	Percentage
Total number of cases.....	70	100
Acute gonorrheal infections, (first attack).....	38	54+
Acute gonorrheal infections (second or later attack).....	10	14+
Chronic gonorrheal infections.....	22	31+

In this last type we have included all cases existing longer than two months. Practically all of these cases showed extension of the infection beyond the urethra.

The following acute infections other than urethritis were encountered:

	Cases
Epididymitis.....	10
Prostatitis.....	3
Cystitis.....	1

There were seven readmissions for complications or recurrences in the series.

The total number of intravenous administrations of mercurochrome was 280, making an average of 4 per patient.

Six of the seventy men were found to be sensitive to milk and consequently received no foreign protein. It is worthy of note that these men did not respond so readily as the others, but the results were satisfactory even in these six cases. A longer period of treatment was necessary, and many of those who required more than the average number of doses of mercurochrome were in this class.

No renal or intestinal irritation was noted in any of the 70 cases, showing that the use of the foreign protein had apparently no effect in this connection. The glucose solution acted as a protective, as claimed by Potter and Redewill. Mercurochrome alone will occasionally cause renal and intestinal irritation (2).

No severe or dangerous reactions were encountered, and only 10 were classified as moderately severe. The large percentage of the patients suffered no pain or inconvenience beyond a temporary soreness of the buttocks after receiving the milk. The accelerating action of foreign protein and the protective action of glucose in this method of treatment are well illustrated in a series of cases detailed in reference (3).

The results of the treatment are embodied in the table which follows:

	Number	Percent- age
Total number of cases treated.....	70	100
Number of cases considered cured.....	59	85+
Number of cases showing apparent cures but which were detached prior to definite proof.....	11	15+

The remaining 20 cases were either improved or are so recent that sufficient follow-up data are not yet available.

No case has been treated that has not shown a positive and definite improvement.

The average number of days between the first administration of mercurochrome and milk and the securing of the first of the series of negative smears was 12.3 in the 50 cases of the above table.

SUMMARY AND CONCLUSIONS

1. The administration of mercurochrome-220 soluble, together with sugar and foreign protein, according to the technique of Potter and Redewill, is a valuable method of treatment in gonorrheal infections.

2. It is not dangerous to give, reactions are rare, and renal and intestinal irritation is absent.

3. The almost immediate relief of pain is a most striking characteristic, being particularly noted in the cases of acute epididymitis and cystitis.

4. The treatment is much more effective in acute than in chronic infections.

5. Urethral instrumentation and prostatic massage must also be employed in order to secure good results in chronic or recurrent cases.

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TREATMENT OF ENCEPHALITIS LETHARGICA

By HAROLD S. HULBERT, M. D., former Lieutenant, Medical Corps, United States Naval Reserve

The treatment of encephalitis lethargica is now in its third stage of development. At first medical science was balked, and we gave medicine by analogy. Then we entered the phase of antisymptomatic treatment; hyoscine for restlessness, atropin for sialorrhea, supporting treatment, such as iron for anemia, and acidophilus for constipation. The third stage is the administration of those drugs and procedures which produce observable effects on laboratory-controlled infected rabbits. The fourth stage is impending and may be expected from the research laboratories within 18 months, namely, specific serum from immunized sheep for intraspinal use combined with intravenous use to produce passive immunity and for therapy.

At the University of Illinois the following procedure is used routinely now, provided that first the blood-sugar content is found to be normal on a test before breakfast before beginning the course of treatment. Hypertonic glucose solution is given to reduce the congestion in the brain, especially in the periarterial lymph spaces, and alters the permeability of the membranes of the meninges. Sodium salicylate and urotropin are given intravenously and alter the permeability of the vascular endothelium of the meninges. Sodium salicylate solution alone obliterates the vein. Glucose solution makes a good vehicle for the sodium salicylate and makes a good buffer for the urotropin. The administrator should have insulin right at hand lest the patient show symptoms of hyperglycemia.

Similarly, if magnesium sulphate be given intravenously daily to reduce cerebral edema, the administrator should have calcium chloride for intravenous use right at hand lest the patient show symptoms of cyanosis. The glucose, sodium salicylate, and the urotropin are given in courses, ascending, then descending dosages; and first one is given, then two given together, then all three conjointly, and the dosages vary with the patient. They are given once a week for

8 to 12 weeks to a course. The glucose varies from 100 cubic centimeters of 10 per cent to 200 cubic centimeters of 25 per cent solution. The sodium salicylate varies from 10 to 25 grams; the urotropin from 5 to 15 grams.

A typical formula for the fourth week for a 150-pound young adult is:

Glucose, C. P.....	grams..	50
Sodium salicylate.....	do.....	20
Urotropin.....	do.....	15
Doubly distilled water.....	cubic centimeters..	200

Mix. Filter. Autoclave 15 minutes at no pressure. Sig. For intravenous use

MULTIPLE UNERUPTED AND IMPACTED CUSPID AND BICUSPID TEETH

REPORT OF A CASE

By M. W. MANGOLD, Lieutenant Commander, Dental Corps, United States Navy

This is a report of an unusual case of multiple unerupted and impacted teeth in the superior and inferior maxillae. The patient, age 26, with a history of epilepsy, which developed suddenly early in 1922, was referred to the dental department of the United States Naval Hospital, Great Lakes, Ill., for diagnosis. The symptoms consisted of pain and discomfort in the anterior part of the face following each epileptic seizure.

In addition to a deflected nasal septum, which has since been corrected by a submucous resection, the radiogram revealed four malposed and impacted teeth. (Fig. 1.)

The superior right cuspid was found impacted in the buccal plate between the lateral incisor and first bicuspid (Fig. 2) and was easily removed with chisel and mallet. The superior left cuspid was found lying horizontally in the hard palate (Fig. 3), with its apical end curving upward and outward toward the apex of the first molar. The removal of this tooth was more difficult. After the necessary incision had been made the mucosa of the palate was retracted and, with chisel and surgical bur, the tooth was exposed. Due to the extreme curvature of the root at the apex, it was necessary to cut the tooth in half and remove the coronal portion; then, with a very small surgical bur, a part of the convex side of the root was removed. After this had been accomplished, the remaining curved portion of the root end was easily turned outward.

The removal of the unerupted inferior bicuspids without injury to the adjoining vital teeth presented an entirely different problem. A right-angle incision was made, the buccal mucous membrane was raised and turned back and with chisel and surgical bur, the first

bicuspid was exposed and removed. The crown was located at about the middle of the body of the mandible, and the tooth was found to extend downward, below and lingual to the apex of the cuspid tooth. After the removal of the first bicuspid, a small portion of the crown of the inferior second bicuspid was visible, but, in view of the patient's general condition, it was deemed advisable not to prolong the operation. The unerupted second bicuspid was removed three weeks later. This tooth was found to extend from near the middle of the body of the mandible downward, under and lingual to the mesial root of the first molar tooth. (Fig. 4.)

The four operations were performed under conduction anesthesia. After the removal of each tooth, all sharp overhanging and pointed bone was removed, the margins of the bone were well rounded, and the wound was thoroughly irrigated.

The mucoperiosteal flap was replaced and sutured, and the wound packed with iodoform gauze. The patient was placed in bed and given a mild sedative, and an ice pack was applied.

There were no reactions, the postoperative treatment consisting of daily irrigations and gradual reduction in the size of the iodoform gauze dressing.

MIXED VENEREAL INFECTIONS

WITH REPORT OF CASES

By G. F. COOPER, Lieutenant (Junior Grade), Medical Corps, United States Navy

It is the purpose of this article to call attention to certain mixed infections, chancroid and chancre, which are quite commonly seen in tropical duty. The patient who has this condition is usually admitted with a diagnosis of chancroid. If uncomplicated by bubo formation and under proper treatment, the sores usually heal in a few weeks, with the exception of a small nodule which persists for several weeks—although completely covered by mucous membrane or scar. The lesion may be negative for *Treponema pallidum* on dark-field examination, and the blood serology be likewise negative after repeated examinations.

After a few weeks, often two or three months, the sore breaks down and discharges a clear, or serosanguineous fluid, which is found to contain numerous treponemata. The blood Wassermann or Kahn test is also positive at this time.

As it is almost impossible to distinguish a mixed chancroidal and syphilitic lesion at the beginning by inspection, and as the sore may be seen before induration and the presence of specific organisms can be demonstrated, we can only be guarded in the diagnosis of such



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FIG. 1.—ANTERIOR VIEW



FIG. 2.—IMPACTED UPPER RIGHT CUSPID



FIG. 3.—UNERUPTED AND MALPOSED UPPER LEFT CUSPID



FIG. 4.—UNERUPTED LOWER RIGHT FIRST AND SECOND BICUSPIDS

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infections, and close follow-up of all chancroids is necessary to obtain early diagnosis and treatment.

One method is available which may be successful in detecting an early syphilitic infection in the presence of a coexisting chancroid. This is the provocative Wassermann test. The writer has shown that a greater number of positive blood tests may be obtained in primary lesions by the intravenous administration of a small amount of neosalvarsan and testing the blood in 12 to 24 hours.⁴

If a positive blood test is obtained by this method we may start specific treatment at once, while continuing local treatment to the chancroid.

Another very common type of lesion seen is the multiple variety, which heals rapidly under treatment, with the exception of a single sore which is stubborn and in two or three weeks indurates and shows all of the characteristics of a true chancre, including laboratory diagnosis. For this reason it should be certain that a separate dark-field examination is made on each ulcer, repeated daily if necessary.

Occasionally a patient is seen with a chancroid when admitted. In a few days a bubo develops which is not the painful type resulting from chancroid, which shows a tendency toward suppuration, but of the hard syphilitic variety.

The chancroid heals, but there is no change in the adenitis. After a few days a new sore develops in close proximity to the chancroid, or from the old scar if healed, and this second sore is usually positive for *T. pallidum*. If one is careless and fails to observe closely, neglecting a second dark-field examination, the specific nature of the sore is not discovered.

Two cases which illustrate the common type of mixed infection are given below:

CASE REPORTS

Case 1.—In hospital for few days with diagnosis of chancroid. Several dark-field examinations negative. Kahn test negative. After returning to duty sore healed entirely, but a small nodule remained at the site of the original sore. In about two weeks this nodule began to ulcerate, discharging a clear, thin serum which contained an average of 11 *T. pallida* per microscopic field. Kahn test at the same time was 2+.

Case 2.—In hospital with chancroid at base of shaft of penis, which was healed in a short time, and patient was returned to duty under treatment. After spending about 30 days in hospital and returning to duty, the sore began to exude a blood-stained discharge. On reexamination the sore was positive for *T. pallidum* and the Kahn test was 2+.

⁴Cooper, G. F.: Provocative reactions in primary syphilis, U. S. N. Med. Bull. 23: 3 and 4.

The cases reported above are by no means unusual. In fact, such are relatively common, these two cases coming to notice in a space of three days. They were carefully treated and examined, and no evidence of syphilitic infection could be determined prior to discharge from the hospital.

However, it is so important that early syphilis be treated early, that too much stress can not be placed on the value of everlasting watchfulness where there is the slightest possibility of mixed infection. This means every genital sore in the Tropics.

The greatest number of sick days is due to venereal disease, and, forgetting the professional and the humane point of view, the subject becomes very important from an economic standpoint. Too often the incubation stage is taken into consideration by the medical officer, to the exclusion of careful laboratory work. If a sore developed in three days after exposure, he thinks of chancroid, forgetting that in 7 to 10 days more the rest of whatever entered the system during exposure may develop, i. e., the *treponemata*.

Also, he may not take into consideration the fact that the man may have been exposed 10 days previous to the three days claimed. With the lack of amusement that exists in the Tropics for single enlisted men, exposure to venereal disease becomes a recognized form of pastime for a great many individuals, especially around pay day. At the same time there is a greater liability to intoxication and consequent failure to take prophylaxis, or carelessness as to its use within the proper time limit. Proper prophylaxis, in the first hour after exposure, especially the free use of soap and water before the application of drugs, would greatly reduce the number of mixed sores, or of any other kind.

However, in summing up, the medical officer is responsible for the careful diagnosis of such lesions, and he can not watch too carefully for the appearance of suspicious sores. Early treatment must be instituted for the benefit of the patients, many of whom do not take seriously his lectures on the benefits to be derived from chastity.

CAISSON DISEASE DURING HELMET DIVING

REPORT OF A CASE

By W. M. ANDERSON, Lieutenant Commander, Medical Corps, United States Navy

O. G. U., torpedoman, second class, aged 20 years, weight 175 pounds, physical condition excellent, while, at about 2.20 p. m., February 17, 1927, under diving instruction on U. S. S. *Widgeon* off Lahaina, Maui, Hawaii, descended, with a regulation diving helmet properly adjusted, to a depth of about 5½ fathoms (33 feet). He

was beneath the surface approximately seven minutes when he removed the helmet and came to the surface. He struck out for the ladder apparently in perfect condition, but suddenly it was seen that he was in some difficulty. A line was thrown to him which he was able to grasp and he was helped aboard. He appeared somewhat exhausted and was given a massage of arms and legs. He stated that his right arm and leg had seemed to become suddenly paralyzed and that he had difficulty in breathing.

He had previously made some 15 or 16 dives in training, and had gone down from 30 to 250 feet. He had also done some helmet diving at about 33 feet, and had "ducked" the helmet with no ill effects. In view of the above facts, his condition was not considered a case of caisson disease, and he was not placed in the recompression chamber at the time.

Within a short time he developed tetanic and clonic convulsions of the muscles of the right arm, right leg, neck, and back. He stated that he felt a sense of constriction about his chest. Other than that he suffered no pain and was perfectly rational in his conversation with the medical officer. Convulsions occurred at irregular but short intervals. He was removed to a civilian hospital at Lahaina, where every effort was made to control the convulsions by means of morphine and other hypnotics. Examination showed anesthesia in right arm and leg, as well as loss of normal reflexes. Temperature 98.6, pulse 100 to 110, and respiration 18 to 24. There was no paralysis of sphincter muscles; pupils were equal and reflexes normal. There was no nausea, vertigo, or disturbance of vision.

During the night the convulsions subsided somewhat and he was able to obtain some sleep. By morning there was some return of feeling in the right arm and leg and he was able to make coordinated movements with them.

At 7 p. m., February 18, 1927, he was removed from the civilian hospital to the *Widgeon* and placed in the recompression chamber, accompanied by the medical officer. He was recompressed to 22 pounds and gradually decompressed to zero in about 35 minutes without any apparent benefit. During this afternoon and night convulsions continued at irregular intervals. His pulse went down to as low as 50 per minute and respiration to 12 per minute. About 7 a. m., February 19, the patient was transferred to the United States Naval Hospital, Pearl Harbor, T. H. The convulsions were fewer, and he seemed to be resting easier. Pulse, 60 per minute. Respiration, 22 per minute.

After a consultation with Lieut. Commander G. R. W. French, Medical Corps, United States Navy, recompression was recommended, and, with the permission of the commanding officer of the hospital,

he was taken to the *Widgeon* for recompression. Lieutenant Commander French's report was as follows:

2-20-27 at 1342 placed U. O. G., T. M. 2c, U. S. N., in recompression chamber, and recompressed to 75 pounds excess (absolute 90), for five minutes. Decompressed: 60 pounds for 2 minutes; 45 pounds for 18 minutes to 30 pounds in 20 minutes; 20 pounds in 40 minutes; 10 pounds 1 hour; 0 pound in 1 hour and 35 minutes. During latter stage O₂ was given. At 1742 the chamber was opened and diver found in improved condition. Diver was taken from the chamber, brought out on deck, and found capable of walking. Returned to hospital.

G. R. W. FRENCH.

Patient was discharged to duty on February 23, 1927, with no complaints or disturbances of any kind.

CONCLUSIONS

(a) It is quite evident that caisson disease may appear in a diver at shallower depths and from shorter exposure than the diving manual may lead one to think, and that the symptoms may be quite severe.

(b) All divers should be warned against "ducking" their helmets, even at shallow depths and after short exposure.

(c) No matter what symptoms may occur in diving, recompression at greater pressure than that to which the diver has been subjected under water should be tried. In this case nearly 72 hours elapsed before proper recompression was given, yet it was effective.

From symptoms and signs manifested in this man there was probably a cerebral (gas) embolism.

NOTE.—Since the report above was written this man has made several dives, one of which was to a depth of 42 fathoms (252 feet), without any ill effects or symptoms of caisson disease. He is now a qualified diver and likes the work.

ARTERIO-VEINUS ANEURYSM OF THE COMMON CAROTID ARTERY AND INTERNAL JUGULAR VEIN—OPERATION WITH CONSERVATION OF THE ARTERY

REPORT OF CASE

By F. X. KOLTES, Commander, Medical Corps, United States Navy

E. A. B., electrician's mate, second class, was admitted to the naval hospital, Pearl Harbor, T. H., July 2, 1926. He had been shot through the neck, a .25 caliber bullet having entered the left side at the level of the cricoid cartilage and passed behind the trachea without apparent damage to important structures. Bleeding was reported to have been profuse after the injury but had ceased when patient arrived at the hospital. The only treatment indicated was rest and simple dressings.

On the fourth day contraction of the left pupil and slight ptosis of the left upper lid were noted. At the same time a slight enlargement was discovered in the left side of the neck in line with the great vessels and under the wound of entrance. The tumor displayed nonexpansile pulsation and a pronounced systolic thrill. Auscultation revealed a systolic murmur which was transmitted with diminishing intensity along the carotid in both directions. It was evident that a traumatic aneurysm had formed. Although no venous pulsation was noticeable, it was strongly suspected to be of arteriovenous type on account of the disproportion of the murmur, which was loud, and the tumor which was scarcely visible on inspection. The eye symptoms were no doubt caused by involvement of the cervical sympathetic in the lesion.

The patient was kept under observation in the hospital one month and on duty for two months. No change in the condition in the neck was noted. The pupillary inequality also persisted. The aneurysm had, therefore, become established and operation was decided upon.

Under ether anesthesia incision was made along the border of the sterno-cleido-mastoid muscle. The carotid artery and internal jugular vein were exposed above and below the lesion and clamped. By careful dissection the aneurysm was cleared of surrounding scar tissue and found to consist of a canalicular connection between artery and vein. When blood was flowing the aforementioned thrill stood out with increased clearness. Being sure that Crile's clamps were controlling the circulation, a curved incision was made in the vein around the place where the opening into the sac was judged to be. Retraction of the cut walls plainly revealed the opening, which was oblong and one-half inch in its greatest diameter. Its walls were veinlike; the interior was lined with glistening endothelium and contained a small organized clot adherent at one side. The arterial opening was much smaller than the venous. The sac was entirely freed from the vein. A silk ligature was then thrown around it flush with the walls of the artery and the distal end cut away. A few sutures, applied Lembert fashion, were then taken to cover the stump. When the clamps were removed circulation was promptly reestablished. There was no leakage. The portion of the vein involved in the lesion was resected and the wound of the neck closed.

The patient was seen five months later and was entirely well.

The subject of arterio-venous aneurysm is a very interesting one. Practically always they are traumatic in origin. When the leakage of blood from artery to vein is considerable, the vein and its branches in the vicinity become dilated, giving rise to pulsating varicosities

of ever-increasing size. The heart may be forced to increase its effort to compensate for leakage and often becomes hypertrophied, in much the same manner as in aortic regurgitation. Increased blood pressure in the veins being present, a damming in the vessels occurs, which may react upon the right heart. The whole process may become a vicious circle. When these complications exist, operation may be both difficult and dangerous.

In the case at hand the leakage was slight, not enough to give perceptible venous pulsation. It involved a very important vessel, however, operation upon which is beset with uncertainty. Usually any type of aneurysm which involves the common carotid requires to be treated by ligation and extirpation of that portion of the vessel. Attempts to employ the conservative operation of Matas upon the carotid are especially dangerous, and that great authority does not recommend it, considering extirpation safer. It was therefore fortunate to find it possible to treat this case by the mere ligation of the fistulous tract, causing no injury to the intima and thereby avoiding clot formation, which, as Bickham states, is the most common and most serious occurrence in blood surgery.

CREEPING ERUPTION

REPORT OF CASE

By H. L. SHINN, Lieutenant Commander, Medical Corps, United States Navy

The writer was prompted to bring this case to the attention of the medical profession after reading an article in the Journal of the American Medical Association of October 9, 1926, on the same subject, written by Krestjan J. Austmann, M. D. Also, it might be of interest because very few, if any, cases have been reported in this section of the country.

CASE REPORT

Mrs. A. L. D., aged 28. Residence, Virginia Beach, Va.

Family history.—Unimportant.

Past history.—Unimportant, except that patient had resided at Virginia Beach about one month prior to infection and had spent a good deal of time on the beach and in swimming.

Present history.—The first indication of any infection was noted during the night. Both feet burned and itched intensely and the patient thought that perhaps she had been bitten by mosquitos. She could not sleep and, on inspection, found several red streaks on the tops of both feet and several between the toes. After a day or so the burning and itching became so severe that she consulted a local physician who diagnosed the case as ring worm and gave her some treatment. The condition got worse and she finally went to another doctor who diagnosed the case. This doctor froze the infected places with ethyl

chloride on several different occasions which made the lesions so painful that the patient could hardly walk, but the condition progressed and new lesions developed.

At the time the patient was first seen the feet were swollen, excoriated between the toes, and several new lesions were present on top of the foot. No attempt was made at this time to treat the case owing to the soreness and inflammation present. The following observations were made:

1. That the organism progressed or traveled about 1 inch a day in no definite course, although there was a slight tendency to circle formation, giving some of the lesions the appearance of ringworm.

2. The track left by the organism was red, somewhat scaly over the healed portion, and at the site where the organism was present there was a slight tendency to blister.

3. The patient complained that the itching predominated at the site of the blister and was most severe at night. She was practically unable to wear shoes. Owing to the fact that no laboratory facilities were available, no attempt was made to isolate the organism, but the picture presented an absolutely typical case of creeping eruption.

Treatment.—The following treatment was used and resulted in a positive cure within 10 days and speedy relief to the patient from the itching:

1. The entire track followed by the organism was burned with lunar caustic.

2. The lunar caustic was applied heavily over the site occupied by the organism.

3. A circle about one-fourth inch in diameter was burned around this last site.

The areas burned were covered with gauze and adhesive for protection. That night the patient had no discomfort except a slight burning from the lunar caustic.

The following day the feet were quite inflamed from the burning, but there was no evidence of any extension of the infection. The lesions were washed with alcohol and dressed with a 5 per cent mercurochrome ointment.

The same evening the patient complained of some itching and the following morning one of the organisms had started another track at a right angle to the old one. The other organisms were apparently dead. The new lesion was burned with lunar caustic, the scabs were removed from the old lesions, and several suspicious looking points were also burned.

Mercurochrome ointment was applied daily to the lesions and the scabs from the burn were removed.

About the fifth day one of the lesions itched somewhat and appeared as if the organism was alive. Mercurochrome ointment alone was applied after the scabs had been removed and the lesion healed readily.

CONCLUSIONS

1. That the case was contracted at Virginia Beach, most probably from contaminated sands on the beach. One other case occurred at this beach, since a patient suffering from the condition applied to Mrs. A. L. D. to know who treated the case. The author did not see the second case, since he had left the vicinity.

2. That the treatment used did cure the condition, stopped the annoying symptoms very readily and with comparatively little pain, and left no scar formation.

DEATH BY LIGHTNING

REPORT OF CASE

By J. D. BENJAMIN, Lieutenant, Medical Corps, United States Navy

It is seldom that a medical man happens to see a definite case of death by a direct bolt of lightning. The writer, having seen such a case, deems it of sufficient interest to report.

Recently, while the writer was on duty at Corry Field, the land-plane training station at Pensacola, Fla., a terrific rainstorm came up. As the rain subsided a chief petty officer rushed up in an automobile and called the medical officer. In the rear of the car he had a civilian said to have been struck by lightning while driving a truck across a bridge about 5 miles from the field.

The man who had been struck by lightning was apparently dead when first seen by the medical officer. No evidence of respiratory movements was seen nor could the pulse be palpated nor heart sounds heard. On one side of his scalp was a bare spot from which some slight hemorrhage had taken place, while around this area was a definite border of burned hair. Running down each arm was a red streak about $1\frac{1}{2}$ inches wide, such as might have been made by searing with a red-hot iron. Similar streaks, only wider, were seen on the anterior chest wall, extending from about 3 inches above the nipple line downward across the chest and abdomen and as far down the thighs as the middle third. At the termination of this red streak on one thigh was a red area looking like a deep burn. It was the writer's conclusion that this spot marked a contact with the brake or some other part of the car and made a ground for the conduction of the lightning through that leg and the metal part of the automobile. Artificial respiration, stimulation, and other emergency measures were tried and continued for more than an hour without result. The coroner was called and viewed the body and accepted the diagnosis as death by lightning.

The history of the accident was that this man had been employed on a new bridge carrying loads of dirt on an automobile. Several flashes of lightning had been seen by other workers on the bridge. The car of the man who was struck by lightning was proceeding across the bridge when it was suddenly seen to swerve and crash into the side of the bridge. Examination of the car showed the metal work to be distorted and some of it melted.

There seems little doubt that this was a true case of death by lightning from the history of the case and the appearance of the man's body.

DEVICE FOR TRANSFERRING PATIENTS FROM SHIPS

By THOMAS SCHOFIELD, Master Rigger and Laborer

A ship's officer, in a recent conversation with me, said that he had been transferred at sea from his ship to a hospital ship for an emergency operation. He was lowered over the side in a wire stretcher by means of a whip, deposited on the thwarts of a motor sailer, carried to the hospital ship, and hoisted aboard in the same manner. He stated that the suffering he went through during this handling and transfer was about three times as much as that occasioned by the operation itself. In addition to this suffering caused

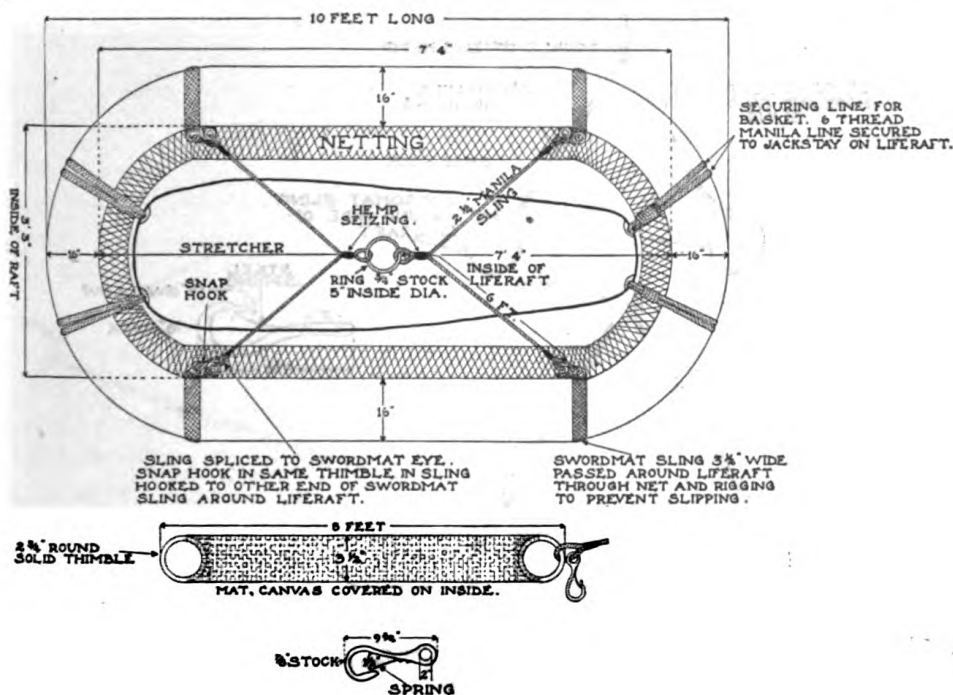


FIG. 1

by unavoidable rough handling, there is great danger of the patient being drowned while undergoing transfer from one ship to another at sea in case the boat in which he is carried is swamped.

To make the handling of wounded and sick from one ship to another at sea easier for both attendants and patient and safer for the patient, the following method is suggested: A simple and inexpensive sling should be carried by all ships, this sling to be fitted to one of the large life rings as shown in the sketches and photograph. The patient, securely lashed in the stretcher, is placed in this life ring as shown, and the stretcher lashed in place. The life raft

^b From U. S. navy yard, Mare Island, Calif.

can then be picked up, using any convenient crane or boom, by means of the sling, and swung over the side and lowered on to the thwarts of the boat which is to carry the patient. The hooks on the sling have snap fastenings, as shown in the drawings, to prevent releasing when the ring is landed on the thwarts. On reaching the hospital ship, the life raft with the patient is picked up by means of the sling again and landed at any convenient point on the deck, from which the patient can be carried to any desired place. If the transfer is made in rough weather, and the boat should be swamped or capsized,

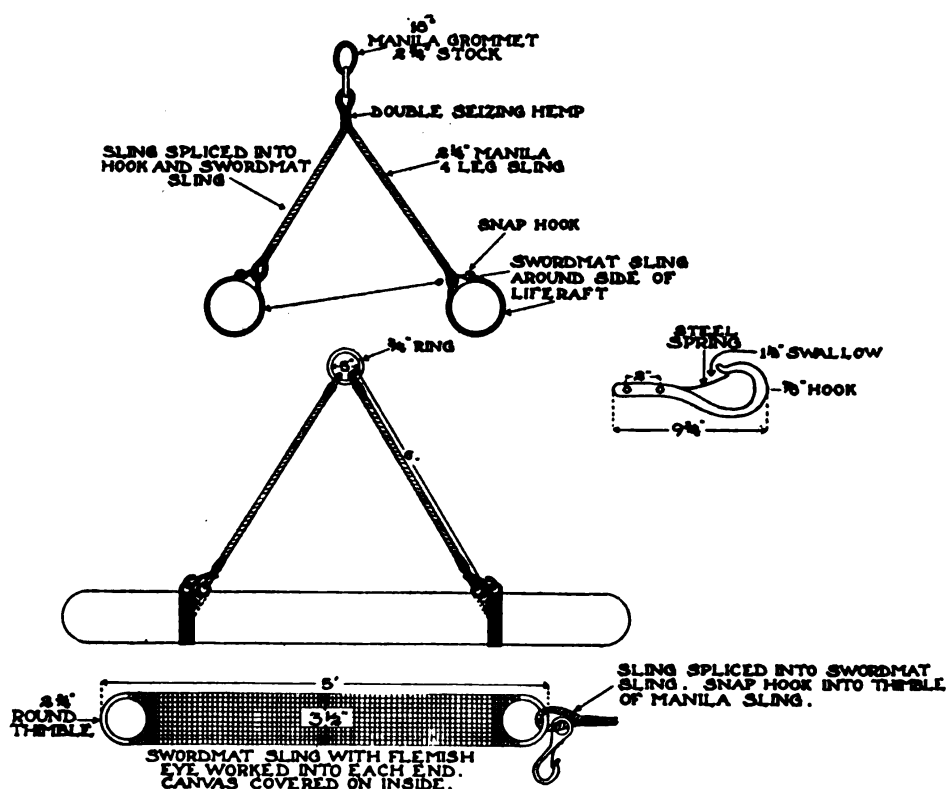


FIG. 2

the life raft will float off and carry the patient safely, and in addition provide buoyancy for the boat crew.

All that is necessary in the way of extra equipment for the above scheme is the sling, all ships carrying life rafts. These slings are simple and easy to make, and comparatively inexpensive, the estimated cost being \$27.50.

It is believed that every ship operating at sea should have one of these slings, which can be carried secured in the life ring, without taking up any space to amount to anything or being in anybody's way.

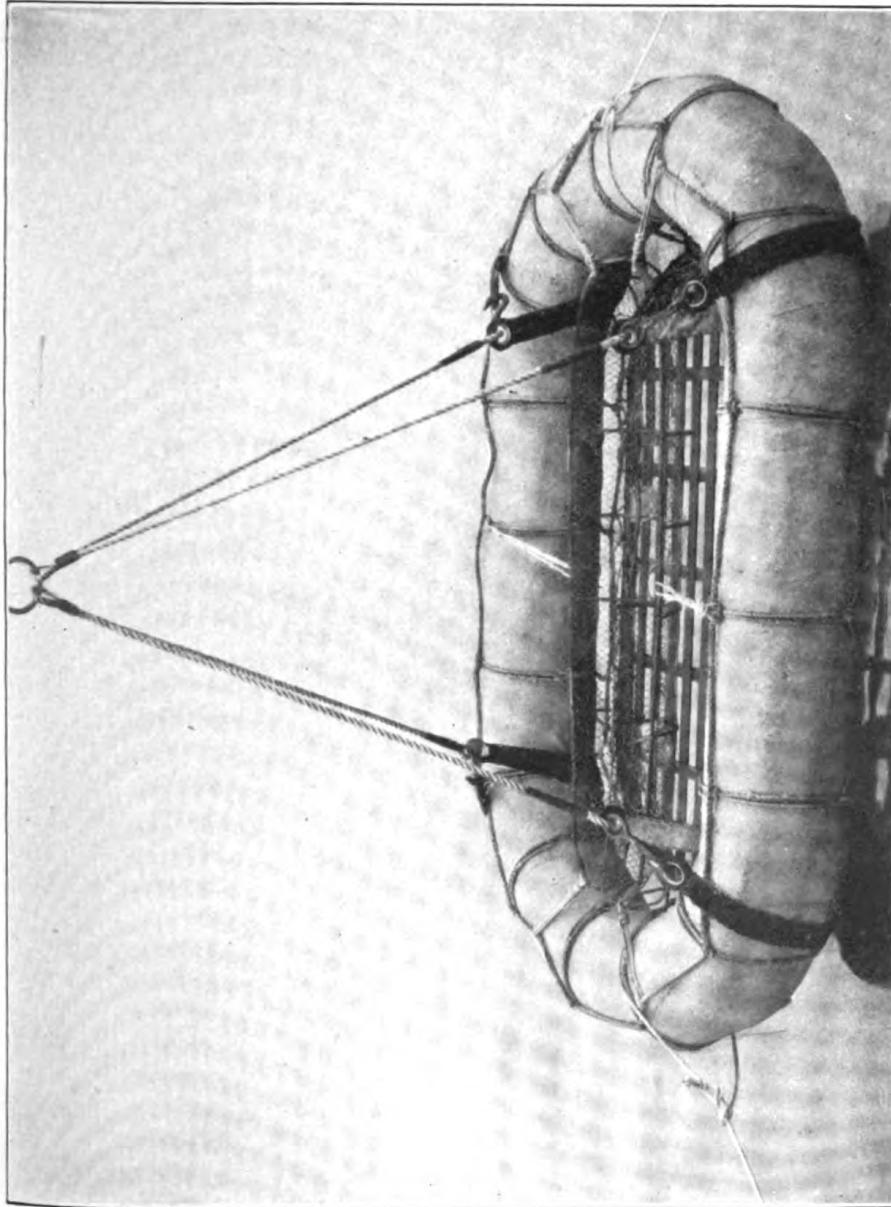


FIG. 3.—LIFE RAFT AS UTILIZED FOR TRANSFERRING PATIENTS FROM SHIP. SCHOFIELD DEVICE

635-1

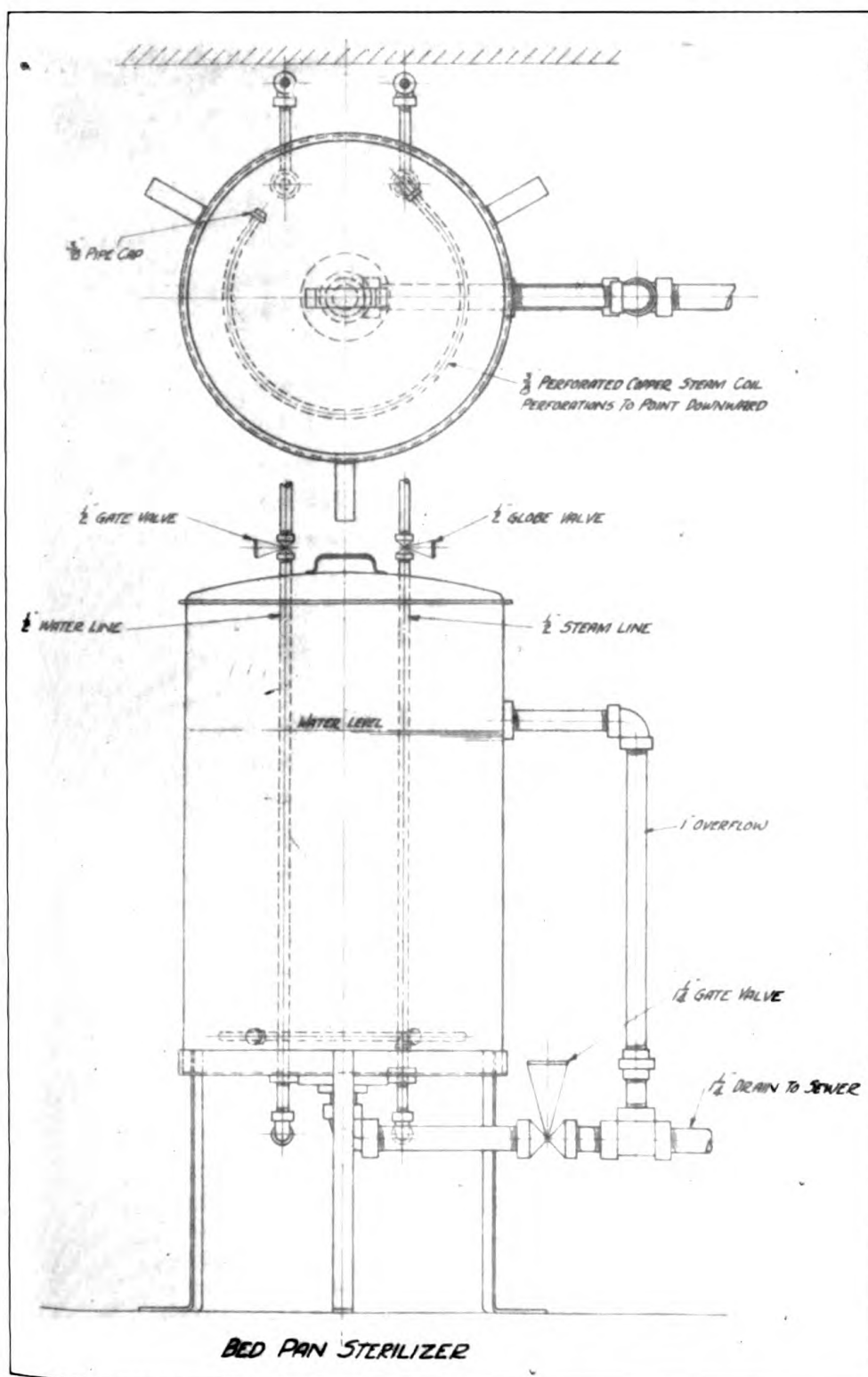


FIG. 1.—DIAGRAM, SHOWING CONSTRUCTION OF STERILIZER. (PEEK)

636—3

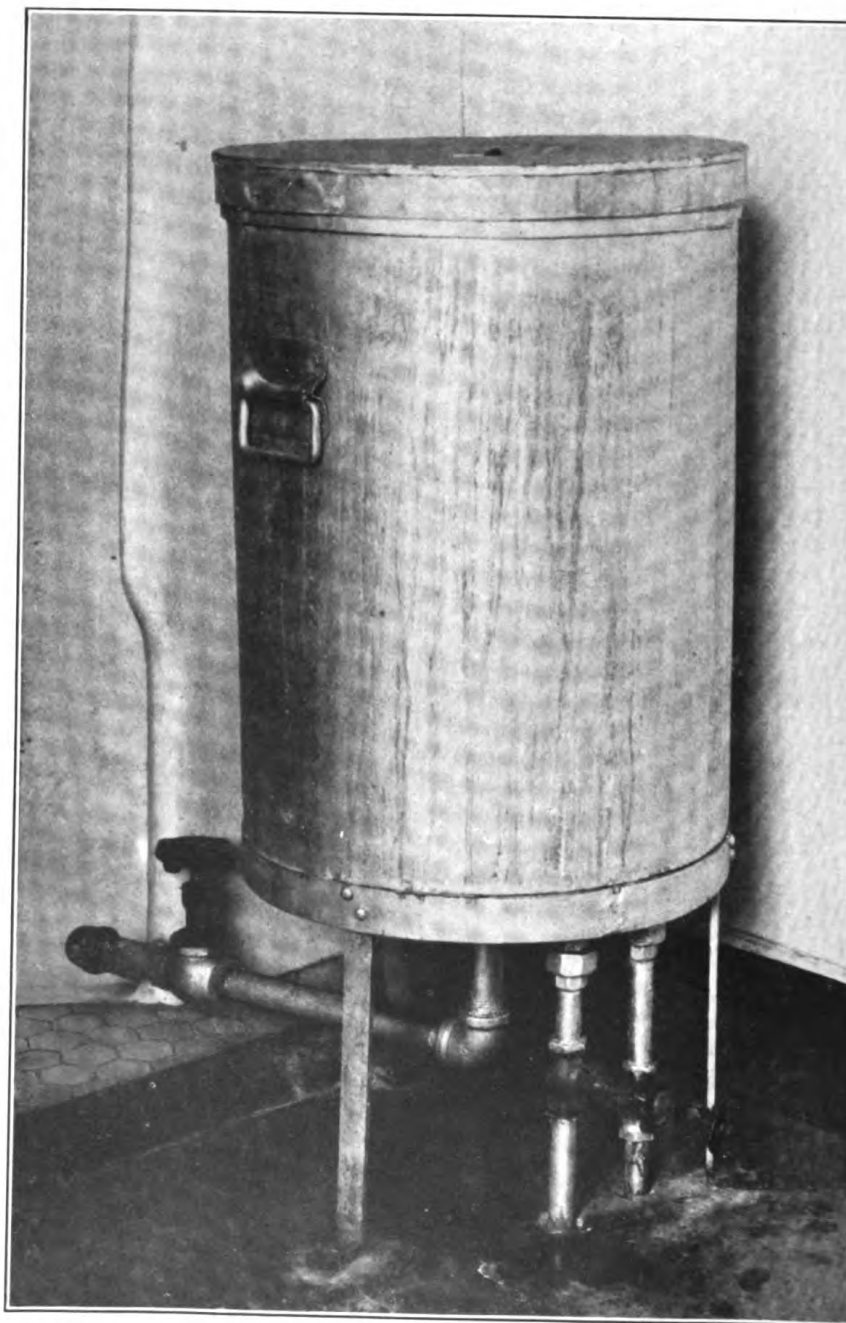


FIG. 2.—UTENSIL STERILIZER MADE FROM GALVANIZED IRON GARBAGE
CAN. (PEEK)

636—4

In case several patients are to be transferred at a time, the wire stretchers may be done away with, mattresses laid on inside platform of the float, and the patients placed on these mattresses.

In case of stranding where breeches buoys are not available, a small type float, properly equipped with slings, will serve the purpose of a breeches buoy.

AN ECONOMICAL AND PRACTICAL UTENSIL STERILIZER

By CHARLES PEEK, Chief Pharmacist, United States Navy

For the benefit of those who may desire to have a utensil sterilizer and find that funds are not available for the purchase of any of the custom-made ones, there are submitted herewith detailed specifications of a practical one, designed by the writer and Mr. Charles McNabb, chief mechanic, naval hospital, League Island, Pa., that can be manufactured at any naval hospital by the hospital force, at an approximate cost of \$6. There were eight of these sterilizers built and installed in the League Island hospital during the past year, and, so far as practical purposes are concerned, they are fully equal to a custom-built one costing from \$150 upward.

The shell of this sterilizer consists of a water-tight, galvanized iron garbage can, 18 by 25 inches.

This sterilizer can be connected to any available steam line carrying not less than 5 or more than 50 pounds pressure.

Figures 1 and 2 illustrate the sterilizer and its construction.

THE NAVAL RESERVE

APPOINTMENT

Officers are commissioned in the reserve by the President, to serve during his pleasure in the same grades and ranks as do the officers of the regular Navy, appointments and promotions being made pursuant to law and in accordance with regulations prescribed by the Secretary of the Navy.

To be eligible for appointment in the reserve an applicant must be a citizen of the United States or of its insular possessions, and must take the oath of allegiance to the United States; he must be not less than 18 years of age, and not over 31 years for the rank of lieutenant (junior grade), 35 years for the rank of lieutenant, and 40 years for the rank of lieutenant commander or above. These requirements as to age may be waived in special cases if circumstances justify such action.

All candidates will be required to conform to the standards by physical examination as prescribed for candidates for commission in the regular Navy and must be free from any defect or pathological condition which would interfere with the performance of the duty expected of them in the Navy.

The physical examination is thorough and the candidate is required to certify that he is free from all mental, physical, and constitutional defects.

For acceptance as an officer, a minimum height of 66 inches, barefoot, and a minimum weight of 132 pounds, stripped, is required.

Professional examination is usually required of a candidate on appointment; but this requirement may exceptionally be waived, and the professional qualifications of the candidate established by the letters, the certificates, and the other credentials which are required to be submitted with his application.

A candidate for appointment as a medical officer must apply to the commandant of the naval district in which he is located. The application for appointment should be written in the following form:

SIR: I request permission to be examined for appointment in the grade of assistant surgeon, rank of lieutenant (junior grade), United States Volunteer Naval Reserve.

I was born at — on — 19—; graduated from — medical school in 19—, and am licensed to practice medicine in the State of —.

I am a citizen of the United States, residing in —, county of —, in the State of —.

I forward herewith letters testifying to my moral character, habits, citizenship, preliminary education, medical education, society membership, license to practice medicine, and professional qualifications.

Very respectfully,

(Name in full, written legibly)

The COMMANDANT,
(— *Naval District*)

The above application must be accompanied by the following certificates:

(a) Letters or certificates from two or more persons of good repute, testifying from personal knowledge to good habits and moral character.

(b) Satisfactory evidence of citizenship. Any one of the following may be considered as satisfactory proof of citizenship:

IF NATIVE BORN

- (1) A duly verified copy of a public or church record of the birth.
- (2) The affidavit, under oath, of the physician, midwife, or other person present at the birth.
- (3) In cases where neither (1) nor (2) can be obtained by the candidate, the affidavit of either parent.
- (4) In cases where the candidate certifies that no one of the above is obtainable, the affidavits (under oath) of two reputable citizens acquainted with him. Each of these affidavits should state the facts within the knowledge of the deponent upon which he bases his statement as to the citizenship of the candidate—as, for example, that he has known the candidate since birth, that he knew his parents, that he knew him to be a bona fide voter, or as the case may be.

IF FOREIGN BORN

- (1) Certificate of naturalization, under the seal of the court in which naturalized.
- (2) Certificate of naturalization, under the seal of the court in which naturalized, of the parent during the minority of the candidate, together with the affidavit of a parent that the candidate is the child of the parent whose certificate of naturalization is submitted.
- (3) In special cases where the candidate certifies that neither (1) nor (2) is obtainable, the affidavits of two reputable citizens acquainted with him. (See par. 4, under native-born citizens.) As every naturalization is a matter of record in some court, these affida-

vits will be accepted only in very exceptional cases, and on the understanding that the candidate shall later submit a proper certificate of naturalization.

(c) **Certificate of medical education.** This certificate should give the name of the school and the date of graduation, and be signed by dean or registrar.

(d) A certificate from the president or secretary of a State or local medical society to the effect that the applicant is a member in good standing.

(e) A certificate of license to practice medicine.

(f) If the candidate has had hospital service or special educational or professional advantages, certificates to this effect, signed by the proper authorities, should also be forwarded.

The commandants of the various naval districts should be addressed as follows:

First naval district.....	Navy yard, Boston, Mass.
Third naval district.....	South and Whitehall Streets, New York, N. Y.
Fourth naval district.....	Navy yard, Philadelphia, Pa.
Fifth naval district.....	Naval operating base, Hampton Roads, Va.
Sixth naval district.....	Navy yard, Charleston, S. C.
Seventh naval district.....	Naval station, Key West, Fla.
Eighth naval district.....	Naval station, New Orleans, La.
Ninth naval district.....	Naval training station, Great Lakes, Ill.
Eleventh naval district.....	Naval base, San Diego, Calif.
Twelfth naval district.....	313 Customhouse, Washington and Battery Streets, San Francisco, Calif.
Thirteenth naval district...	Railroad Avenue and Georgia Street, Seattle, Wash.
District of Columbia.....	Navy yard, Washington, D. C.

REGULATIONS GOVERNING APPOINTMENTS IN AND TRANSFERS TO THE FLEET NAVAL RESERVE

The total number of officers in Class MC-F (medical corps, fleet) in each district is fixed by the Navy Department from time to time.

When vacancies occur in the prescribed district quotas, appointments or transfers to fill the vacancies will be made by the President and Bureau of Navigation, respectively, upon the recommendation of the commandant of the district, as follows:

1. Graduates of the Naval Reserve Officers' Training Corps may be appointed in Class MC-F.

2. Qualified commissioned officers of the Volunteer or Merchant Marine Reserve may be transferred to fill vacancies, provided they bid fair to maintain efficiency by attending drills and performing training duty.

Physical qualifications.—All candidates for appointment or transfer must establish their physical qualifications in accordance with the standards for the same rank or grades of the regular Navy to

perform all the duties of their ranks or grades at sea before a statutory or special medical examining board.

Physical defects will not be waived for appointment in or transfer to the Fleet Naval Reserve.

Professional qualifications.—All candidates for appointment or transfer to the Fleet Reserve must establish their professional qualifications by a written examination. The examination will be waived in the case of Volunteer Reserve officers who formerly held permanent commissions in the regular Navy.

Rank.—Officers of the Volunteer Naval Reserve who have held permanent commissions in the regular Navy may be transferred to the Fleet Reserve with the permanent rank held by them in the regular Navy. Other candidates may be transferred or appointed only at the foot of the list of lieutenants (junior grade) in Class MC-F.

Promotions.—In the Fleet Naval Reserve promotion is in accordance with lineal precedence lists in the order of seniority and, from the grade of lieutenant commander down, promotion is in this order to fill vacancies in the various grades.

Four years' service and 60 days' active service is required in each grade—lieutenant, and lieutenant (junior grade)—before the officer is eligible for promotion.

Training duty requirements.—In time of peace, officers of the Fleet Naval Reserve shall perform 15 days' training duty each fiscal year unless excused therefrom for good and sufficient reasons, of which the Bureau of Navigation shall be the judge. (Sec. 20 of the act.)

Duty other than active or training duty.—Duty other than active or training duty for members of the Fleet Naval Reserve is authorized by law as follows:

(a) Officers above the rank of lieutenant—

Appropriate duties.

Administrative functions, only if and when in command of an organization.

(b) Officers below rank of lieutenant commander—

Regular drills, only when attached to a division.

Equivalent instruction or duty, only when attached to a division.

Appropriate duties, only when not attached to a division.

Administrative functions, only if and when in command of an organization.

Appropriate duty in the case of officers of the MC-F class may consist, according to circumstances, of any of the several occupations here listed:

- (a) Duty at headquarters.
- (b) Inspection of sanitary units, afloat and ashore.
- (c) Inspection of medical supplies.
- (d) Instruction of medical personnel.
- (e) Instruction of personnel in first-aid procedure.
- (f) Conduct of physical examinations.
- (g) Acquiring familiarity with the Manual of the Medical Department or other publications as may be prescribed.

A drill will be interpreted as an assembly, other than a week-end cruise, designated in advance, at which practical work of not less than one and one-half hours' duration in duties pertaining to the Navy is conducted.

PAY AND ALLOWANCES

1. *Pay*.—Officers below the grade or rank of lieutenant commander * * * shall receive compensation at the rate of one-thirtieth of the monthly base pay of their grades or ranks (that is, one day's pay) for attending, under competent orders, each regular drill or other equivalent instruction or duty.

No officer * * * shall receive compensation for more than 60 drills or other equivalent instruction or duty in any one year. (Such) pay * * * shall not accrue to any officer * * * during a period when he shall be lawfully entitled to pay for active duty or training duty. (Sec. 21 of the act.)

2. *Subsistence*.—Officers of the Fleet Naval Reserve will be allowed cash in lieu of subsistence during week-end cruises on board vessels assigned to training the Naval Reserve at a rate of 30 cents per meal during the time they are actually on board and away from their home port, for periods of not less than 24 hours.

3. *Uniform gratuity*.—Upon transferring to the Fleet Naval Reserve, \$100 is paid in cash and thereafter an additional sum of \$50 upon completion of each period of four years in the Fleet Naval Reserve.

In time of war or national emergency, a further sum of \$150 for purchase of required uniforms shall be paid to officers of all classes of the Naval Reserve when they first report for active duty.

The above gratuities shall be paid when the officer concerned certifies that he has in his possession in good condition service dress, blue; service dress, white; overcoat, sword, sword knot, undress belt.

REGULATIONS GOVERNING APPOINTMENTS IN THE VOLUNTEER RESERVE

These are essentially the same as those governing appointment in the Fleet Naval Reserve except that appointments are made from among applicants in civilian life. The Secretary of the Navy will

not waive any defects in the volunteer general class but may in the volunteer special class. The professional status is usually established by the credentials submitted with the application, and professional examination is not required. Section 35 of the act of February 28, 1925, provides:

That officers and enlisted men of the Volunteer Naval Reserve shall not be required to attend drills or perform training duty and shall receive no pay or allowances, except when ordered to active duty or training duty: *Provided*, That they may, upon their own application approved by the direction of the Secretary of the Navy be given the same active duty or training duty, with or without pay, as is provided for officers and enlisted men of the Fleet Naval Reserve.

In order that Volunteer Reserve officers may perform training duty with pay, their applications must be received early in the year, because after the training quotas are filled, all available funds are obligated. Additional officers who apply for training can then be permitted to take training duty without pay, if at all.

There is no allowance for uniforms in the Volunteer Reserve, but, upon transferring to the Fleet Naval Reserve, the allowance provided for the Fleet Naval Reserve is paid in cash. For uniform allowance in time of war for Volunteer Reserve see above under Fleet Naval Reserve.

USUAL ERRORS, MISCONCEPTIONS, AND MISUNDERSTANDINGS

Those who have read "A Plebe at West Point" will recall the *savoir faire* of the hero of that story when he finished reading a posted notice which concluded about thus:

"After having read this notice, the candidate will execute *right face*, etc." Of course he had had training in the Army—he subconsciously knew that those short directions were the result of years of experience, that the method was the most practical one. He immediately stood out among the other candidates who formed nothing more than an unthinking crowd.

The Bureau of Medicine and Surgery is fortunate in having to deal with a profession which is primarily a thinking one, but unfortunate in having to deal with a profession which is a busy one, which is composed of skeptical minds who must have experimental proof. Many will not comply with the simplest request until convinced that no other way will do.

The following few paragraphs are submitted to the medical profession in place of experimental proof of the fact that the procedure suggested in the circular of information usually sent out is deserving of their approval, and also to give the reader an insight into some of our problems.

A doctor who either is busy, thinks he is busy, or wishes to convey the impression that he is busy, becomes interested in the Naval Reserve. He jots on a 1-cent business post card—"Please send information about Navy Medical Reserves," and remembering how clever crooks sometimes forge signatures, and wishing to protect his bank account, he signs in hieroglyphics. There being no appropriation available for a "Rosetta stone," the bureau experts, after futile and prolonged study, report that it is not possible to decipher the signature. Just as the surgeon facing an inoperable carcinoma points out the possible benefits of Röntgen-ray therapy, they point out the success of the Post Office Department in delivering the card, by a process of elimination, having tried in turn all the possible Government services, beginning with the Public Health Service and ending with the Navy.

Thus it is that a suggestion is made to clip out the hieroglyphics and paste them on the outside of the envelope instead of typing the name. As for the city and State, they are known, thanks to the postal canceling machine.

Somehow the letter reaches its destination, for, after a lapse of some time, the form which was intended as a guide in writing a properly worded application, arrives, clipped from the information circular. A clipping from an advertisement, asking for information, or ordering Webster's International Dictionary is convenient for a busy individual, and serves its purpose—dealing, as it does, with a temporary transaction which is soon completed. But an application for appointment in the Naval Reserve must pass through the hands of the commandant of the district, Bureau of Medicine and Surgery, Bureau of Navigation, and then must become part of the officer's file in the Navy Department. A mere clipping is difficult to attach to other papers, and easily lost. An ordinary sheet of paper may cost more, the writing of the application require more time, but, when typed or at least legible, such a document fulfills its mission admirably.

The spirit of research reveals itself in many applicants who introduce modifications into the application form, or leave out vital parts in order to see what will happen. None of them would remove the heart from a patient to see what would happen, yet that is exactly what they do when they eliminate the sentence: "I forward herewith letters testifying to my moral character, habits, citizenship, preliminary education, medical education, society membership, license to practice medicine, and professional qualifications."

The doctor is so well known in his community that he almost takes it as an affront that the rest of the world can be so ignorant as not to know of his existence or qualifications. It is well for him to remember this: There are individuals, not qualified, or who,

while holding a degree of M. D., are a blemish on the whole profession. Men have obtained appointments in the Naval Reserve, carried on nefarious practices, and when they clashed with the law, bolstered up their case by pointing out that they were of the Navy, produced orders to training duty, and got off easily because they were leaving the community to go on "active duty." Thus they made capital of the good name and honor of the naval medical service. Such will object to submitting credentials, and such are not wanted. The ethical medical man wants the Naval Medical Corps ethical and on the highest plane, and once understanding the reasons, will not hesitate to submit credentials. The bureau has no other way to judge in most cases except by careful study of credentials submitted.

The application with all papers and credentials must be sent to the commandant of the naval district in which the applicant is located. The doctor, however, under the influence of fraternal bonds of the profession, naturally gravitates toward the medical department and writes directly to Washington, D. C. Such expression of confidence, while flattering to us, and provoking us to offer a hearty handshake, delays matters. All papers must be returned with request that they be sent to the commandant. This is because the Naval Reserve is decentralized and each commandant is autonomous within his district. He knows whether and what vacancies exist in his district and, in his indorsement, often adds information as to the needs of the service in his locality, enabling the Navy Department to balance properly a very large organization. The commandants of the various districts are really genial gentlemen, whom it is a pleasure to meet. To allay the phobias among the profession we may add that often some close relative of the commandant is or was a medical man and the commandant will be found quite sympathetic. No hesitancy should be felt, therefore, in sending the application to the commandant of the district.

Frequently letters are received in the Bureau of Medicine and Surgery testifying to moral character, etc., of an applicant for appointment. Such letters are usually addressed to the Surgeon General. In a large organization such as the Navy, letters so received can only be read and filed pending arrival of other papers from the commandant. By forwarding all papers fastened together to the commandant, extra clerical work is avoided, and it is not necessary to trust someone's memory, when the application of Doctor North arrives, to recall that three weeks ago Doctor Brown wrote a testimonial as to Doctor North's character.

Rank.—It will never be known how all the myths surrounding the question of rank arose. Now and then, and not too infrequently

either, a doctor recalls that a United States citizen has become President of the United States merely because of the sovereign will of the people. Why, then, he reasons, if he himself assumes obligations by entering the Naval Reserve, can't he be appointed at least an admiral? The bureau in such cases can only politely point out that he can not be so appointed because the same sovereign will of the people, expressed through the act of their legal representatives in Congress assembled, forbids it. We are very sorry that this must be so.

And even in the lower ranks of volunteer classes, where rank is determined by definite rules, the bureau is continually bombarded by requests of applicants for appointment in ranks as high or higher than those held by men who have been in the Reserve for years, and who have been former professors of those very applicants when the latter were medical students. We are again sorry, but it can not be done.

Under those circumstances, we are not surprised to receive an ultimatum, wherein we learn that if the Navy can not see excellent officer material when it is in full view, the Army can. Contrary to expectation, no one loses any sleep over this ultimatum. Our sleep is not distributed by visions of colonels and generals because of a memorandum from the Surgeon General's office of the Army. That memorandum states: "Letter January 10, 1927, prohibits rank higher than that held during World War. Necessary to graduate from United States Service Schools for advanced rank. Original appointment without war service first lieutenant and not over 36 years of age."

Unfortunately, applicants allow themselves to be disturbed by various rumors about the Army or even the Navy offering some other applicant academically junior to themselves, a higher rank. The facts are:

1. In the Fleet Naval Reserve, transfers are only at the foot of the list of lieutenants (junior grade), except in case of officers who held permanent commissions in the regular Navy.

2. In the Volunteer Naval Reserve, both for general and for special service, the rank of applicant is determined on the basis of academic seniority, age, experience, and training in the medical specialties. Anyone will readily understand that to give higher rank to a graduate of 1921 than that held by graduates of 1915 would speedily disorganize the Naval Reserve. Similarly we know of no instance where of two associates the one of less experience directed smoothly the one of greater experience. And since we can not by a fiat add a single cubit to the stature of any applicant, we must content ourselves by merely fitting each into the existing organiza-

tion according to his qualifications. He may be an excellent man and rate much higher rank, but there are other excellent men already there, of greater experience, academically senior, older in years, who rate more; but, since the organization is comparable to a pyramid, there must be greater numbers at the base, or in lower ranks, and progressively smaller numbers as the apex is approached.

The quotas in the Naval Medical Reserve are limited, and the bureau, after filling the vacancies, will necessarily have to cease recommending further appointments. Applicants are considered in the order of their application, so that those desiring to avail themselves of the advantages and privileges arising from an appointment in the Naval Medical Reserve should not delay in submitting their applications.

The least of such advantages, if one can consider it so, is the pay and allowances. Yet many medical men, especially the younger men, attach almost too great an importance to the question of pay and allowances. The Government demands little of their time and pays in proportion. According to section 11 of the act of February 28, 1925:

Commissioned officers of the Naval Reserve, when employed on active duty or training duty, with pay, or when employed in authorized travel to and from such duty, shall be deemed to have been confirmed in grade and qualified for all general service. They shall receive the pay, allowances, including longevity pay, as provided by law for the reserve forces of the United States, and shall when traveling under orders receive transportation in kind, mileage, or actual expenses, as provided by law for travel performed by officers of the regular Navy.

RECENT APPOINTMENTS

Name	Rank	Class	Dated appointed
Allen, William J.....	Lieutenant (j. g.).....	Vol. (G).....	Mar. 23, 1927
Cox, Russell Mills.....	do.....	Vol. (G).....	Mar. 4, 1927
Dodd, Verne Adams.....	Commander.....	Vol. (G).....	Nov. 11, 1926
Ham, Clem.....	Lieutenant (j. g.).....	Vol. (G).....	Jan. 27, 1927
Hitzmann, Louis Anthony.....	do.....	Vol. (G).....	Nov. 9, 1926
Levin, Israel.....	do.....	Vol. (G).....	Dec. 8, 1926
May, Ross Reynolds.....	do.....	Vol. (G).....	Feb. 15, 1927
Moore, William.....	Lieutenant.....	Vol. (G).....	Jan. 27, 1927
Phillips, John Reed.....	Lieutenant (j. g.).....	Vol. (G).....	Oct. 23, 1926
Shearer, Beryl Cecil.....	do.....	Vol. (G).....	Mar. 7, 1927
Westerfeld, Otto F.....	Lieutenant commander.....	MC-V (S).....	Nov. 9, 1926
Lewis, Paul A.....	Commander.....	MC-V (G).....	Nov. 16, 1926
Maxson, Frank T.....	Lieutenant commander.....	MC-V (S).....	Mar. 1, 1927
Dement, D. E.....	Lieutenant (j. g.).....	MC-V (G).....	Apr. 1, 1927

RECENT PROMOTIONS

Dubois, Eugene Floyd.....	Captain.....	MC-V (G).....
Hillis, David Sweeney.....	do.....	MC-F.....
Rosenau, Milton Joseph.....	do.....	MC-V (S).....
Smith, Rea.....	do.....	MC-V (G).....
Donnell, R. H.....	Lieutenant commander.....	MC-V (G).....

NURSE CORPS

HOSPITAL HOUSEKEEPING

By NELL I. DISERT, Chief Nurse, United States Navy

To the uninitiated a hospital is a huge building for the care of the sick; to some, a place from which to keep away; to others, a home of refuge, but all agree that among the chief assets are order and cleanliness.

The function of a modern hospital is not alone to care for the sick within its confines, but it should reach out into the community, demonstrating to sick and well alike the modern methods of hygienic living. In other words, it should be the health center of the community which it serves.

The prime necessity of any hospital is an adequate staff of physicians and nurses, who will maintain a high standard for the institution. Not only must the medical and nursing care be of a high order but the whole institution must be kept clean, sanitary, and free from pathogenic bacteria.

Hospital housekeeping plays a very important part in keeping the hospital machinery running smoothly. This most important function in the hospital has been defined as the method of keeping the hospital in an excellent condition by careful attention to all the details which go to make up the basic rules of sanitation and well ordered living.

Cleanliness and health, like the "Gold Dust twins," go hand in hand. The duties of hospital housekeeping are delegated to the nurses in the institution, as these duties are so correlated and inter-related with the duties of caring for the sick.

The directress of the nursing department or the superintendent of nurses is therefore the person who organizes and directs the nurses in their work. Under her supervision, the wheels of the department under her charge run smoothly and economically.

The nurses are taught and practice the most hygienic methods of keeping their wards and the equipment sanitary and clean. They are responsible for the care of furnishings and are taught to conserve expensive equipment, such as rubber goods, instruments, and bedding, by keeping them in an excellent condition.

The careful sterilization of instruments is also a part of their work. The best methods of keeping all surfaces and furniture free from dust, the floors properly polished, mattresses and clothing disinfected, are noted and practiced by the careful nurse.

The diet plays a very important part in caring for the sick, not only for the comfort of the patient but for the reputation of the hospital, as the hospital kitchen is an extremely vital organ in both the medical and household economy.

The food should be palatable and daintily served. Since nurses are responsible for ordering and economy in the use of supplies, they should see that the food is attractively arranged on the trays, that the dishes are clean, and that the food is served in not too large quantities. The dietetic nurses are taught food values. They know how to obtain and prepare foods which represent the highest standards of nutrition, at a minimum cost.

They also understand how to prepare and serve a corrective diet when prescribed, and act as teachers in instructing the diabetic patient how to prepare his own diet after he leaves the hospital that his health may be, in a measure, conserved.

To her should be given the knowledge of the cost of all food. It is her function to organize and assign the duties of the kitchen help, as it makes for economy and efficiency if the status of each employee from dietitian to dishwasher be established.

The dietitian is responsible for her department, to see that waste is eliminated. Palatable food, well prepared and nutritious, does not necessarily mean expensive food. Therefore, it is economy to employ the best cook available, as he will be able to prepare an appetizing meal at a minimum expense, whereas a poor cook can spoil the most expensive ingredients.

The disposal of garbage might be considered in connection with the kitchen management. In the first place, this may be reduced to a minimum if the food be properly cooked and served, thus eliminating waste on trays. Food not served could be used again if properly prepared.

All garbage should be kept carefully covered to prevent the gathering of insects or animals, and every precaution should be taken to prevent these pests invading a hospital.

All these details do not escape the watchful eye of the nurse in her effort to maintain a sanitary hospital.

Proper ventilation is another point to be considered in good hospital housekeeping and various devices may be discovered and applied in keeping the air fresh and pure. The nurse should detect air which is vitiated at once and be able to correct it.

She should also discover and report at once any defect in heating, telephone, or electric bell systems. Sewerage and plumbing defects should be discovered and reported promptly.

The patients should be taught the proper use of plumbing, in order that they may cooperate in keeping it in good condition, as nothing causes more inconvenience than clogged drainages.

The value of sunlight can not be too greatly stressed. Patients should be taught the value of direct sunlight as a purifier and germ killer and should be encouraged to cultivate the habit of sleeping in fresh air and sunshine whenever possible.

Fresh, clean linen must be supplied in order to keep the patient well cared for, clean, and comfortable. Here again the ingenuity of the busy nurse must be brought into play, as linen is very expensive and laundries are careless.

All linen should be carefully inspected, and when torn should be immediately repaired.

The soiled linen needs special attention. Stains should be removed when possible, and all linen used by a patient suffering from infectious disease should be kept in a special container to avoid spread of the disease. This linen should be thoroughly disinfected before sending it to the laundry.

The nurses take their turns in the linen room that they may better understand the value of economy in the distribution and use of the linen on the wards, as well as the necessity of keeping it in repair.

Economy and efficiency are two important goals which all modern hospitals try to keep before them in their management. Economy of hospital supplies should be preached and practiced on all occasions, both by precept and example, for it is the little leak here and there that causes big defects.

Good hospital housekeeping seeks to stop these leaks whenever possible, that the maximum of service may be obtained at the minimum of expense.

DIETS AND THE NURSE

By J. BEATRICE BOWMAN, Superintendent, Navy Nurse Corps

Whether the preparation and administration of food has not been sufficiently brought to the attention of nurses as a scientific treatment of disease, or whether nurses dislike the study of cooking and handling of food, is the question uppermost in the bureau at the present time. If the latter, this should be overcome, as the saying "A man is what he eats" seems to be almost literally true; and if so, is it not the responsibility of the nurse, in her administration to the sick,

to see that the sick man be made whole by good foods scientifically combined?

The mind does not function properly and the spirit is low if the body is not properly nourished; therefore it behooves us, as caretakers of the body, to interest ourselves, forcibly if need be, in the subject of fueling these marvelous engines of life. Our Surgeon General has often said that every woman who has work to do for humanity should have as her foundation the course in nursing, and he, without doubt, feels that every graduate nurse has had instruction in diets for the sick. To-day this subject is forcing itself upon us as the greatest factor in our work, and it is hoped that while each naval hospital is earnestly complying with the department's accounting and budgeting system, the Nurse Corps will make a special effort to interest itself in the combination of foods and their value to the body health. If there be perfect cooperation between the chief nurse and the pharmacist, two important members of the hospital staff having their fingers on the pulse of the institution, then they in turn will bring about a spirit of helpfulness all along the line.

The very mention of the diet kitchen has to some nurses meant drudgery and uninteresting detail, but we notice that the hospital that has a diet nurse, who, because of her knowledge, her spirit of cooperation, and her enthusiasm, brings about perfect coordination in the commissary, the general mess, the galleys, and the special diet kitchens, has not only the most scientifically fed patients and the least waste, but its entire atmosphere radiates good will.

Navy nurses have, with the greatest interest, shown their ability as teachers and executives, and now that the Hospital Corps men are showing that the foundation stone was substantial, they are rising to higher responsibilities; so let us be proud of them and continue to help, by cooperating wherever we can.

We have found the pharmacists to be most courteous and men of keen judgment and excellent training. We can, therefore, with pride cooperate and make the institution to which we are attached shine as an example in efficiency, economy, and happiness. Recently letters were received from the nurses who have completed the course in diets for the sick at Miss Farmer's School of Cookery, Boston. These nurses feel that there is a big work to be done and the bureau is gratified that it was able to arrange the course for them. Their work as pioneers should now be taken up by more of our corps; in fact, the nurses should be so much interested that they will want weekly or monthly classes in this subject in order to familiarize themselves with this highly important treatment of the sick.

The following article written by Miss Lucy Minnegerode, superintendent of nurses, Public Health Service, shows how she feels toward this subject:

SOME OBSERVATIONS ON THE DIETETIC SERVICE IN HOSPITALS

The most difficult problem confronting administrators of hospitals and other institutions is found in the food department.

The most difficult position to fill in any institution, particularly in hospitals, is that of dietitian or housekeeper.

Probably the greatest cause of discontent among both patients and personnel, of complaints and criticism from patients and their friends, of friction between nurses who must serve and hear complaints, and dietitians who are responsible for preparation and condition of food sent to the wards, is found in this department.

There is no factor in a hospital more vital, nor any which so affects the morale throughout the institution as food.

During the last half century, with the steady advance in medical science, nursing technique, and hospital administration, a standard for procedures in these departments has been established and maintained, and every hospital administrator, physician, and nurse is conversant with the duties and functions pertaining to their particular department and is expected to conform to this established standard. Inaccuracies in technique, as far as it pertains to the treatment of patients, on the part of doctors and nurses are not condoned or overlooked. In all hospitals there is a definitely understood place for the administration, medical service, and nursing service, sharply defined lines of demarcation, and these lines serve to preserve the balance and keep each department in its appointed place.

The dietitian's service in comparison with these others is still young. Established standards do not exist, such as are found for the other services, and yet from time immemorial the question of food in hospitals has been a vital one.

Sick people are harder to please than well people. Special diets are often unappetizing at best and may become practically impossible if special attention is not paid to the preparation and service.

The greatest expense of a single unit in a hospital is found in the food department, the greatest opportunity for economy through the elimination of waste, and the greatest opportunity for extravagance in expenditure of funds and supplies.

To be successful from every point of view, a hospital dietitian should know not only how to buy, to calculate a specific number of calories, to make out menus for various mess halls and special diets, but she should also have a thorough knowledge of culinary art, a sense of responsibility to the hospital in the expenditures of funds, accuracy in the preparation of special diets, and a genuine interest in and sympathy for the problem of the invalid whose appetite needs to be successfully tempted.

Since in this department there is always more or less criticism, one wonders where the fault lies and what the remedy is.

In the first place, is the training adequate? On the answer to that question the solution of the whole problem rests. I do not believe that the training for hospital service is adequate from various angles. All of these items have been suggested to me by dietitians, whom I have consulted, as having possibly a direct influence upon the question under discussion.

1. Are the students given a thorough training in cooking?

2. Do they have contact with patients during their period of training so that the patient becomes an individual to them?

3. Are the four to six months as student dietitian in a hospital following a theoretical training sufficient to give the hospital idea to any but the most exceptional student?

4. Is there a tendency among home economic graduates to look down upon the women who take up hospital service? If this is so does such an attitude encourage the proper type of student to take up hospital work?

(1) If a woman is going to undertake a life work in connection with food, it seems only proper and right that she should be given thorough instruction in the preparation of food. Is this done in all home-economics schools?

Fresh foods are always more palatable than canned, even though their preparation for cooking is more troublesome, and the use of canned foods should be eliminated as far as possible. The food in all institutions where cooking is done in bulk and where steamers are used is apt to be more tasteless than where it is prepared in smaller quantities in the home. This is but another argument for greater care in the preparation of diets for the sick or convalescent.

In nurse training schools in the old days, when a hospital dietitian was unknown, all nurses were given lessons in what was supposed to be dietetics but which was really cooking school. Diets were outlined by the doctors, and when so outlined a nurse was thoroughly competent to prepare the diet. Can an average graduate of a home-economics school prepare a proper meal to-day, and if not, how can she direct the activities of a unit charged with the preparation of food?

(2) In the case of both medical students and nurses, the contact with the patient is made almost upon the entrance on their course of clinical study and continues during all the years of their preparation for a diploma. The patient is the sun around which the entire hospital system revolves. Every thought is centered on the proper diagnosis, treatment, and execution of orders for the benefit of the patient.

Thought for the patient becomes automatic, subconscious, and ever present.

Unless there is daily or hourly contact with the sick, how can anyone get the idea of the necessity for recognition of each patient as a separate and distinct entity with idiosyncrasies as regards foods as well as drugs? Unless there is this recognition of the individual the treatment by diet is not as successful as it should be. Contact with patients (intimate contact) should be part of the training in home-economics courses. Unless this is done recognition of the necessity for individual attention to each diet is not sufficiently emphasized, with resulting loss of benefit to the patient, the hospital, and the dietitian.

To-day many medical cases are treated only by diet, therefore diet becomes a therapy, and as such, quite as important as any other therapeutic measure. As a therapy then there must be considered the individuality and tastes of the patient. Accuracy in preparation becomes an essential and inaccuracies can not be overlooked.

(3) In addition to four years' preparatory work, it takes medical students three years of intimate contact with patients to become doctors. Nurses have three years of even more intimate contact with patients before they can secure a diploma. Dietitians, after their two to four years' theoretical training is complete, are given four to six months of training in a hospital diet kitchen under a full dietitian, and are then considered prepared for appointment as dietitian in a hospital. Is it possible in that length of time to acquire even in a very moderate degree the hospital or patient's point of

view? If it takes physicians and nurses three years of close contact with patients, can a dietitian in four months get the same point of view as regards the needs of the individual? Is there no way in which those students at least who are desirous of entering the hospital service could receive adequate hospital training.

When we consider the difference found in the homes of those housewives who know how food should be prepared and those who boast of knowing nothing about it, we have a basis by which to judge the dietitian who has not an adequate knowledge of cooking. Theory is necessary, but practice in dealing with a practical problem is equally if not more important, and a question naturally arises where one hears dietitians say "I hate the sound of food"; "I can't cook"; whether there is not a flaw in the training of these young women.

Hospitals recording a pound of waste (combined edible and inedible) per ration are not uncommon.

Complaints both from patients and physicians in regard to inaccuracies in the preparation of special diets are as prevalent as excessive waste, and it would seem that while much has been done there is still more to do, and that those interested in this very vital problem would do well to take counsel and endeavor to ascertain by what means these serious conditions may be bettered.

Above all, the dietitian should see that every special diet conforms to the prescription, that the preparation is accurate in every detail, and that it is so served to the patient as to be inviting in appearance and in fact.

Articles relating to dietetics will be published in future numbers of the BULLETIN.

DIETETICS AT NAVAL HOSPITALS

By ANNA F. PATTEN, Nurse, United States Navy

In the spring of 1923 the Bureau of Medicine and Surgery planned to train each year a given number of Navy nurses to take the place of the civilian dietitians then employed at the naval hospitals. The nurses were allowed to elect the course, thus getting a group especially interested in this type of work. The course was given at Miss Farmer's School of Cookery, Boston, and covered a period of three months. It included in this period the essentials for hospital dietitians, the nurses all having had a good foundation at their own training schools. Special attention was paid to nephritic, diabetic, high and low caloric, and the numerous other diets needed for the sick.

The diet problem in the naval hospitals differs from that of the civilian hospitals. In civil life, a patient on a diet for a great length of time is treated in the home. In the Navy, the hospital must supply this care and the patient be made fit for active duty before being discharged. Our diabetic patients are usually Veterans' Bureau patients or enlisted men of long service. In this one disease our problem is much like that of the civilian hospital; the admittance to the medical service, a test meal to determine patient's sugar tolerance, 24-hour specimen to laboratory for sugar, acetone, and

diacetic acid, and a blood chemistry. With this information, the doctor writes a food prescription and the ward nurse forwards it to the dietitian.

If insulin be used, care is taken that the patient's diet reaches the ward and is served to him within the allotted time, usually within 20 minutes after the insulin is injected. While taking the course at Boston the nurses attended the splendid clinics given by Doctor Joslin. These clinics are a boon to the diabetic patients all over New England, and were an inspiration, as they demonstrated what may be done to teach a patient the possibilities of keeping well by giving him an intelligent and optimistic outlook on his disease.

So, in the beginning of our work with a diabetic patient the dietitian knows him personally and gets him interested in different food values. She constantly impresses two facts—first, that a proper diet can satisfy his appetite, and, second, that the length of his life in relation to his disease depends to a great extent on the food he eats. In a short time the patient is much interested and, with an improvement of his condition, if not a cure, is ready for a medical survey, as a diabetic man is of no use in the naval service because of conditions aboard ship. After being properly instructed while at the hospital, he can, with medical supervision, go back to civil life and carry on his work, as many are doing with comfort. The following table given in the Joslin Diabetic Manual is a simple and accurate way to compute a prescription:

1 gram of protein contains 4 calories.
1 gram of carbohydrate contains 4 calories.
1 gram of fat contains 9 calories.
6.25 grams of protein contain 1 gram of nitrogen.

1 kilogram=2.2 pounds.
30 grams (g.) or cubic centimeters (c. c.)=1 ounce.
A patient "at rest" requires 25 calories per kilogram.

	30 grams (1 ounce) contain approximately—			
	Carbo- hydrates	Protein	Fat	Calories
Vegetables, 5 per cent.....	1	0.5	0	6
Vegetables, 10 per cent.....	2	.5	0	10
Shredded Wheat, 3 triscuits.....	23	3	0	104
Uneddas, 2.....	10	1	1	53
Potato.....	6	1	0	28
Bread.....	18	3	0	84
Oatmeal, dry weight.....	20	5	2	118
Oysters, 6.....	4	6	1	49
Milk.....	1.5	1	1	19
Meat (cooked, lean).....	0	8	5	77
Fish.....	0	6	0	24
Chicken (cooked, lean).....	0	8	3	59
Egg, 1.....	0	6	6	78
Cheese.....	0	8	11	131
Bacon.....	0	5	15	155
Cream, 20 per cent.....	1	1	6	62
Cream, 40 per cent.....	1	1	12	116
Brazil nuts.....	2	5	20	208
Butter.....	0	0	25	225
Oil.....	0	0	30	270

The obesity patient in the Navy sticks to his diet pretty well when he once comes to the attention of a doctor. He has the ridicule of his shipmates to contend with, which helps a great deal, as it makes him want to reduce as quickly as possible. One colored sailor who tipped the scales at 285 pounds was a humorous sight when, after three months, he appeared at the diet kitchen door still wearing, at 185 pounds, the suit of whites made to fit his figure at 285.

The yearly physical examination brings to the doctor's attention many diseases that diet alone can correct. Among the Navy men, as among the civilians, there seems to be a great number of cases known as hyperacidity. This is very distressing, and if not treated in time may lead to gastric ulcer. While doing duty on the U. S. S. *Relief* many cases of this type reported for treatment. The Pacific Fleet, with its many thousand men, would naturally contribute many such cases. For the treatment of these cases, the following diet is outlined:

SIPPY DIET (ULCER DIET)

(20 per cent cream to be used)

Note that the patient receives food every hour from 8 a. m. to 8 p. m. every day for the first three weeks. During the fourth week the feedings are of milk and cream every hour with three small meals as indicated on the schedule. The morning and noon meal should never exceed 15 ounces and the evening meal should never exceed 10 ounces.

Days 1, 2, 3: Milk, 45 c. c. Cream, 45 c. c., to be given at 8, 9, 10 a. m., 12 noon, and 1, 2, 3, 4, 5, 6, 7, and 8 p. m.

Days 4, 5: The same as day 3, plus—

8 a. m., 1 egg.

9 a. m., cereal, 90 c. c.

Day 6: The same as day 3, plus—

8 a. m., 1 egg.

9 a. m., cereal, 90 c. c.

11 a. m., 1 egg.

Day 7: The same as day 3, plus—

8 a. m., 1 egg.

9 a. m., cereal, 90 c. c.

11 a. m., 1 egg.

12 noon, cereal, 90 c. c.

Day 8: The same as day 3, plus —

8 a. m., 1 egg.

9 a. m., cereal, 90 c. c.

11 a. m., 1 egg.

12 noon, cereal, 90 c. c.

4 p. m., 1 egg.

Day 9: The same as day 3, plus —

8 a. m., 1 egg.

9 a. m., cereal, 90 c. c.

11 a. m., 1 egg.

12 noon, cereal, 90 c. c.

4 p. m., 1 egg.

5 p. m., cereal, 90 c. c.

Days 10-14: The same as day 3, plus—

- 8 a. m., 1 egg.
- 9 a. m., cereal, 90 c. c.
- 10 a. m., 1 egg.
- 11 a. m., puree peas, 90 c. c.
- 12 noon, mashed potato, 90 c. c.
- 3 p. m., cereal, 90 c. c.
- 4 p. m., 1 egg.
- 5 p. m., cereal, 90 c. c.
- 6 p. m., custard.

Days 15-21: The same as day 3, plus—

- 8 a. m., 1 egg.
- 9 a. m., cereal, 90 c. c.
- 10 a. m., 1 egg.
- 11 a. m., puree peas.
- 12 noon, mashed potato, 90 c. c.
- 2 p. m., tapioca pudding, 90 c. c.
- 3 p. m., cereal, 90 c. c.
- 4 p. m., 1 egg.
- 5 p. m., cereal, 90 c. c.
- 6 p. m., custard.

Days 22-28: The same as day 3, plus—

Breakfast, 8 a. m.—

- (1) Prune puree.
- (2) Cereal.
- (3) Eggs.
- (4) Coffee.

Dinner—

- (1) Creamed soup.
- (2) Eggs.
- (3) Boiled or mashed potatoes or rice.
- (4) Puree vegetables.
- (5) Custard or pudding.

Supper, 6 p. m.—

- (1) Cracker or bread with butter.
- (2) Boiled rice, cereal, or boiled macaroni.
- (3) Eggs.
- (4) Custard or stewed fruit or pudding.

ROUTINE ULCER MANAGEMENT

(As used in connection with ulcer diet.)

1. Bathroom privileges.
2. Weigh patient at beginning of treatment and twice a week thereafter.
3. Medicines:

- (a) Powder No. 1. "Calcium-soda powder." Calcium carbonate, gr. 10. Sodium bicarbonate, gr. 20.
- (b) Powder No. 2. "Magnesia-soda powder." Calcined magnesia, gr. 10. Sodium bicarbonate, gr. 20.

NOTE.—These powders are to be taken every hour alternately from 8.30 a. m. to 8.30 p. m. and every half hour alternately from 8.30 p. m. to 10 p. m. during the entire stay in hospital.

The "Sippy diet" outlined is the one most used in our hospitals and aboard the hospital ships. These cases are of long duration, the patient being first admitted to the medical service. After a complete course of Sippy treatment many times the pain is relieved and symptoms do not return if the patient is duly careful. Where an ulcer is present and surgery is indicated, the diet before and long after is the same. At first glance, a ward with a number of patients on this diet looks like a big problem, but it can be made very simple by cooperation of ward and diet kitchen.

The fat-free diet is simple, one of eliminating cream, butter, eggs, and other foods high in fat.

The nephritic diet, when ordered by the physician, has so many points. The protein is computed by the following outline in use by the Peter Bent Brigham Hospital, Boston.

NEPHRITIC DIET

Any combination of the foods listed below may be selected.

Foods not listed below must not be taken.

In Groups I and II there is a restriction in the total amount.

The foods in these groups must be served in full or half portions.

A full portion in Group I counts 1.

A full portion in Group II counts 2.

In Group III the quantity of each is not restricted, although one is urged to use discretion.

Points on recipes to count as indicated.

The total for the day should be ———.

The total amount of fluid should be ——— pints.

Do not add salt or spices to the food after it has been cooked.

GROUP I

(Each full portion counts 1)

Full portion:

Bread (white), 1 average slice.
Bread (graham), 1 average slice.
Uneeda biscuit, 5 crackers.
Shredded wheat, 1 biscuit.
Graham crackers, 5 crackers.

Cereals, etc.:

Oatmeal, 2 tablespoonfuls.
Boiled rice, 3 tablespoonfuls.
Corn-meal mush, 4 tablespoonfuls.
Cream of wheat, 6 tablespoonfuls.
Farina, 6 tablespoonfuls.
Macaroni, 4½ tablespoonfuls.

Vegetables, etc., full portion:

Baked beans, 1 tablespoonful.
Lima beans, 1½ tablespoonfuls.

Vegetables, etc., full portion—Continued.

Potatoes, creamed, 1 tablespoonful.
Potatoes, mashed, 1½ tablespoonfuls.
Potatoes, baked, 1½ medium.
Potatoes, boiled, 1½ medium.
Canned corn, 2½ tablespoonfuls.
Green peas, 2 tablespoonfuls.
Beets, 5 tablespoonfuls.
Spinach, 4 tablespoonfuls.
Bananas, 2 large.
Cream, heavy, two-thirds cup.

GROUP II

(Each full portion counts 2)

Full portion :

Milk, 1 glass.

Egg, 1 egg.

Eggs (scrambled), 1½ tablespoon-fuls.

Flour, sifted, two-thirds cup.

Meats :

Lamb chop, broiled, two-thirds chop.

Lamb, roast, 3 by 2½ inches by ¼ inch.

Beef, roast, 3 by 2 inches by ¼ inch.

Beef steak, 1 by 1 inch by 2 inches.

Chicken, roast, ½ inch by 3 by 3 inches.

Fish, full portion :

Cod, boiled, 1 by 1 inch by 1½ inches.

Fish, full portion—Continued.

Haddock, boiled, 1 by 1 inch by 1½ inches.

Halibut, boiled, 1 by 1 inch by 1½ inches.

Mackerel, boiled, 1 by 1 inch by 1½ inches.

Salmon, boiled, 1 by 1 inch by 1½ inches.

Smelt, ½ by 1 inch by 3 inches.

Oysters, 7 oysters.

Crabmeat, canned, 2 tablespoon-fuls.

Salmon, canned, 1½ tablespoon-fuls.

Shrimp, canned, 6 small.

GROUP III

(No restriction)

VEGETABLES

Asparagus.

Cabbage.

Carrots.

Cauliflower.

Celery.

Cucumbers.

Lettuce.

Mushrooms.

String beans.

Tomato (fresh).

Tomato (cooked).

Onions.

Squash.

Turnips.

FRUIT

Apple.

Apricot.

Blueberries.

Cherries.

Cranberries.

Grapefruit.

Grapes.

Muskmelon.

Lemons.

Orange.

Peaches.

Pears.

Pineapple.

Plums.

Prunes.

Raspberries.

Strawberries.

Watermelon.

MISCELLANEOUS

Sugar.

Maple sugar.

Sirup.

Honey.

Candy.

4 dates per day.

3 Sunshine arrow-root cookies per day.

Cornstarch.

Arrowroot.

Tapioca.

Post-toasties.

Butter.

Olive oil.

Aside from these and other special diets, the patients not ready for regular or house diet, as we called it in training school, are fed soft diet and semisoft diet, the menus being made out by the dietitian and approved by the commanding officer.

NOTES AND COMMENTS

COMMENT ON "SOME OBSERVATIONS ON AVOIDABLE DROWNING"

The paper by Lieutenant Commander Miller, which will be found on page 505, was submitted to Mr. Henry Ortland, jr., swimming instructor at the United States Naval Academy, for such comment as he might wish to make. Mr. Ortland's comments are as follows:

The points emphasized in the article, "Some observations on avoidable drowning," have been a source of considerable discussion in the past. Nevertheless, the situation at the present time is as grave as it ever has been.

The evil may justly be placed on the training station, where the new recruit, with a little additional work, could be made thoroughly seaworthy by the introduction of a specified course of swimming.

There is not an institution in the country where the required swimming instruction is on any better or higher plane than at the Naval Academy, nor where the required tests call for any greater application of watermanship. The knowledge here imparted is such that the newly commissioned officer could well handle any group of enlisted men and be practically certain of making them seaworthy.

It is unnecessary for me to elaborate on the method of instruction used here, but suffice it to say that it is along different lines than those laid out by the author of the article.

We have tried out the various systems of instruction with pulleys and eliminating land drill, but have come to the system of instruction now used to cover the 1,500 midshipmen at the Naval Academy.

HYPERTENSION

Much study has been and is being devoted to hypertension, its cause and effects. Three recent papers treating of various phases of the subject seem to be of special interest and value.

The first, "The pituitary gland and cholesterol metabolism," by Robert C. Moehlig and Harriet B. Ainslee, was published in *Annals of Clinical Medicine*, February, 1927. In it the authors attempt to show that the pituitary gland plays a part in the production of hypertension through the increase in the cholesterol in the blood, which accompanies hyperpituitarism. Westphal found an increase in blood cholesterol in 71 per cent of cases of hypertension studied by him. Atheromatous changes in blood vessels are found early in hyperpitui-

tarism. This leads the authors to conclude that hypertension and many other disease conditions associated with changes in cholesterol metabolism are in part, at least, dependent upon the pituitary gland.

In the same number of *Annals of Clinical Medicine*, Joseph H. Barach presents a study of the "Relationship between the acute infectious and chronic diseases." His purpose is to supply the answer to these questions: "(1) Are such diseases or disease states as hypertension with nephritis, essential hypertension, diabetes, cardiovascular disease, chronic nephritis, in part or wholly the late sequelae of certain antecedent infectious diseases, or are they isolated spontaneous diseases independent of previous infections? (2) Does an individual who goes through typhoid fever, scarlet fever, diphtheria, pneumonia, and rheumatic fever really make a complete recovery, even if immediate sequelae are not found after the disease has run its course? Does such an individual get off scot free from his acute infectious disease? Or is the infectious disease of to-day the beginning of a pathological process which will lead in due time to one of the chronic diseases?"

Among the patients studied in the attempt to solve these problems were 143 cases of hypertension. A history of having had typhoid fever was given by 29 per cent of these—a much larger percentage than was found among all patients studied. The number who had had diphtheria was also excessive. Of the sufferers from diabetes and nephritis, 30 per cent gave a history of typhoid fever. While the author does not believe that typhoid fever could be the cause of three such different conditions, he does believe that acute infectious diseases in early life have some effect upon the prevalence of chronic diseases in later life, and that any other disease, if as severe and of as long duration as typhoid fever, would have the same effect as that disease. Destruction of the tissues and organs by the acute disease are given as the cause of the development of the chronic disease in later life.

"Atheromatous degeneration of the arterial wall" is discussed by V. H. Moon in *Archives of Pathology and Laboratory Medicine* for March, 1927. The widely accepted view that atheromatous degeneration is the result of local anemia brought about by endarteritis of the vasa vasorum is not agreed with by this writer. Rather, he believes that the anemia is directly due to arterial hypertension and the atheromatous changes are the result of this. As evidence in favor of his view, the author shows that the areas in which atheromatous degeneration occurs earliest and most frequently are at the points where the artery bifurcates, curves sharply, or its lumen is narrowed and, consequently, where arterial pressure is greatest. As he says, "The explanation is in agreement with many known facts concerning the occurrence and course of such degeneration."

UNRECOGNIZED SYPHILITIC MYOCARDITIS

The American Journal of Syphilis, January, 1927, contains a brief but valuable paper by Clifford E. Henry, M. D., F. A. C. P., commander, M. C., V. (S), United States Naval Reserve, entitled "Unrecognized syphilitic myocarditis." The article is of so much practical value that it is quoted in full.

That unrecognized syphilitic myocarditis has been the cause of more chagrin to physicians than perhaps any other single agency is the opinion expressed by Sir James McKenzie.

In this discussion the very frank cases of cardiovascular syphilis are not considered; but an effort will be made to call attention to a class of cases very often overlooked, a class in syphilis that corresponds in a measure with that class of cases in tuberculosis so admirably discussed by Dr. George D. Head in his monograph, *Concealed Tuberculosis*.

Hirschfelder states that syphilitic affections of the heart are more frequent and present a somewhat more definite picture than tuberculosis (1).

The majority of the patients are in the middle period of life, and the discomfort is attributed to indigestion or to the vague discomforts of approaching years. There are, however, four outstanding symptoms that frequently give a clue to the real pathology. In many cases the diagnosis is made entirely on exclusion, as the Wassermann is frequently negative or not more than one-plus, and there may be an entirely negative history of acquired infection.

Precordial pain is often the only symptom that brings the patient to the physician. The pain is not constant but enough to cause some uneasiness of mind. Aside from arrhythmia, no abnormal signs may be present. This pain may be due to a plaque of sclerosis the result of a congenital syphilis which is a genuine cicatrix causing a disorder of the cardiac rhythm (2).

The cardiac lesions of acquired syphilis and those of the hereditary form do not seem to depend upon the same mechanism. In hereditary syphilis they result from an affection, if not exclusively at least preponderantly, of muscle tissues or of the interstitial spaces. In acquired syphilis, they almost always depend upon vascular changes; therefore the term myocarditis under which they are designated is inappropriate (3).

Blood pressure in these cases may be low, and the examining physician may assume the condition normal. If the blood pressure is below normal or at a low normal it is to be questioned. Hemoglobin is nearly always low, and careful search will not reveal a focus of infection.

Patients whose chief complaints are attacks of precordial pain and arrhythmia, who have a low blood pressure, and low hemoglobin, a one-plus or negative Wassermann, are not by any means all syphilitics, but if no definite pathology is found, it is well to make a therapeutic test.

Salvarsan has shown itself to be so dangerous in cardiovascular diseases that large doses of it are distinctly contraindicated and the usefulness of doses sufficiently small to be free from danger is still uncertain (4).

The mercurials, iodides, and iron are the remedies indicated and should be continued over some period of time. Bismuth salicylate may be indicated if there is a one or two plus Wassermann.

In order not to create a perturbed or depressed mental condition, it is more often best not to inform the patient of the nature of the treatment, but to impress upon him that the case will require supervision for some considerable time.

REFERENCES

- (1) Hirschfelder : p. 322.
 - (2) Vaquez : Diseases of the Heart, p. 313
 - (3) Vaquez : p. 314.
 - (4) Hirschfelder : p. 323.
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TUBERCULOSIS HOSPITALIZATION

A survey of American sanatoria and hospitals for the treatment of those afflicted with tuberculosis and a study of the influence of hospitalization upon the death rate from that disease have been made by Godias J. Drolet, statistician of the New York Tuberculosis and Health Association. The results of this work were published in the American Review of Tuberculosis, December, 1926.

Drolet first discusses the growth of the sanatorium movement in the United States from the time when the Channing Home in Boston was opened in 1857 to the first of the year 1926, when there were 73,715 tuberculosis beds available. The opening of the Adirondack Cottage Sanitarium by Trudeau in 1884 was a great stimulus toward further building.

The writer then shows that the tuberculosis mortality in 1924 in the registration area was 91 per 100,000, which, if the same rate prevailed in the remainder of the country, would indicate that there were 101,922 deaths from tuberculosis in that year. This places tuberculosis fifth among the leading causes of death, whereas in 1910 it stood first.

As has been stated, 73,715 beds were available for tuberculosis patients in 1926. When it is known that 190,000 new cases of tuberculosis were reported in 1924, it is seen that the number of beds available is still far short of the number required.

Three ways in which sanatoria perform a public service are shown to be: "First, that of serving as schools to educate patients suffering from a communicable disease to protect themselves, their families, and the public. Second, to serve as special and proper places for securing in every way possible the recovery of the health of those attacked by tuberculosis, or if this be no longer attainable to give them the best humane care in their dying moments. And, third, to protect the community by serving as places for the segregation of foci of infection."

Basing his estimate upon replies to a questionnaire which he sent to the hospitals and sanatoria of the country, Drolet finds that up to July 1, 1926, there have probably been received as patients by these institutions a total of 1,234,000 individuals. These have all been trained in proper living while in the institutions, and those who have

gone out therefrom to resume their places in the community have, no doubt, carried with them the lessons learned while patients.

Patients cared for during their dying moments number more than 200,000. The removal of these from their home surroundings during the gasping, choking, expectorating stage which occurs before death from tuberculosis must have been instrumental in preventing many dangerous contacts.

That it is to the modern, up-to-date country sanatoria that patients wish to go is shown by the fact that 99 per cent of the beds in the private sanatoria studied were occupied; 96 per cent of the beds in 10 modern public sanatoria and only 82 per cent of those in 10 older town hospitals were in use.

It is estimated that the tuberculosis hospitals and sanatoria in the United States represent an investment of \$277,000,000. The cost of establishing a tuberculosis bed in this country averages, therefore, \$3,761. The maintenance cost averages \$1,125 per patient per year or \$21.60 a week.

Doctor Lotka, of the Metropolitan Life Insurance Co., has made a tentative estimate of the economic loss from tuberculosis. Taking into account only the males, he figures that the annual loss amounts to a billion dollars. Heretofore it has not been possible to assign a money value to the lives of females because of the character of work performed by most of them. With more and more women entering into business life it may be seen that the economic loss will exceed even this figure.

Follow-up and aftercare of patients discharged from various hospitals and sanatoria are neglected in most cases. A large majority of the sanatoria replied to Drolet's questionnaire that they had no plans whatever for such a service. The hospitals under the direction of the Veterans' Bureau keep track of their discharged patients through the regional offices. A few institutions keep in touch with their patients through local tuberculosis associations, county or public-health nurses, or through the city health authorities. On the whole, the follow-up of discharged patients and their aftercare are, in this country, far from being satisfactory.

The writer attempts to estimate the effect of hospitalization upon the general tuberculosis death rate by a study of reports from 10 countries in different parts of the world—the United States, Germany, Italy, France, England and Wales, the Netherlands, Czechoslovakia, Canada, New Zealand, and Japan. These countries have a total population of about 384,000,000, and within one year 531,899 deaths from tuberculosis were reported from them. For the care of these patients, 182,823 institutional beds are reported available. The death rate in New Zealand is 51 per 100,000, while Japan has a rate

of 213. In New Zealand is found the highest ratio of beds available for each death (9 to 10) as well as the lowest death rate. Canada, with a ratio of 7 beds to 10 deaths, had in 1924 a mortality rate of 83. The United States also has a ratio of 7 beds to 10 deaths, and a death rate of 89. In England and Wales the death rate is 106 and the ratio of beds to deaths is 5 to 10. The Netherlands, in 1925, had 4 beds for each 10 deaths, and the mortality rate was 99 per 100,000. Germany, with the same ratio of beds to deaths, had a death rate of 133. France probably has an actual ratio of beds to deaths of less than 4 to 10, and a mortality rate of 170. Italy's death rate, as shown by a recent survey, is about 162 per 100,000, and there is a ratio of beds to deaths of only 1 to 10. Czechoslovakia has a death rate higher than 250, and there is a little more than 1 bed to 10 deaths. In Japan there is less than 1 bed available for 10 deaths and the death rate is 213.

The conclusion drawn by the writer from these figures is that there is a correlation between the tuberculosis death rate and the ratio of beds available. He does not believe that hospitalization is the only factor controlling the death rate, but he does consider that, along with the influence of living and working conditions and of previous tuberculization, hospitalization is one of the outstanding factors in the control of tuberculosis.

MICROBIC DISSOCIATION

The more than 300 pages of the January, 1927, number of the *Journal of Infectious Diseases* are occupied by a learned and exhaustive discussion of this subject by Philip Hadley, of the hygienic laboratory of the University of Michigan.

In his introduction the author shows that during the past 30 years data pointing to the instability of bacterial species have been accumulating. One object of his work is to determine whether there is any "trace of orderliness amidst the general disorder." As he says: " * * * Cocci become rods and rods cocci and spirals; forms of growth change overnight; motility is lost and regained; fermentation reactions are modified by time and opportunity; spore formers become sporeless; hemolytic activity comes and goes; capsulated bacteria lose their capsules, and capsules are gained by noncapsulated forms; antigenic power vanishes and reappears; cultures become spontaneously agglutinative or fail of agglutination; virulent cultures become harmless and harmless cultures virulent. It may be many years before we learn the cause of all these apparent incongruities; but we are bound to attack the problem as best we may and to grasp at any possible thread of orderly change running through the tangled web of bacterial variation."

A new branch of bacteriological study—that is, a study of the changes occurring in bacterial cultures, either spontaneously or under the influence of bacteriophage, will, it is believed by the author, have a real bearing on problems relating to serologic reactions, virulence, immunology, and serum therapy. He predicts that it will be found that bacterial instability follows definite biologic laws which apply widely among unicellular microorganisms.

The reasons for writing the paper are stated by the writer as follows:

It is the chief aim of this paper to expand this view regarding microbic dissociation; to examine in some detail its causes, modes of expression, and effects; to make certain comparisons between microbic dissociation and transmissible autolysis with special reference to the mode of action and effects; to suggest forms of reference for some of the apparently more important "types" of bacterial cultures involved—by means of which thinking may be kept clearer and the interchange of ideas made more effective; to reexamine the nature of bacterial "species" and of bacterial "mutations" in the light of the dissociation process; and to consider the probable biologic significance of dissociation in the life of the bacterial culture and of the bacterial species.

Another purpose stated by the author relates to the problem of the bacteriophage, concerning which there are two schools—that of d'Herelle, which maintains that the bacteriophage is a living, virus-like organism, and that of Bordet, which maintains that the so-called phenomenon of d'Herelle is, in reality, "due to an inherited, vitiated metabolic state of the organism concerned."

In the paper the author gives a review of the development of knowledge regarding dissociative phenomena; discusses the nature of the reactions involved; considers the changes produced by the dissociative reaction; discusses the relation between dissociation and biochemical reactions, virulence, and serologic characteristics; and treats of the incitants to active microbic dissociation. To support his own views, as well as to show the views of other writers, the author has searched and made use of the literature of the world, as is shown by the 15-page list of references appended to his article.

The entire article forms a valuable contribution to the literature and is well worth the time and effort required for its study, but it is too lengthy to allow more than a brief abstract of its conclusions in these pages.

As a result of observation and experiment, Hadley concludes that the phenomenon of microbic dissociation is the manifestation of processes that bear a relation to a physiologic and reproductive mechanism, the nature of which is just beginning to be understood.

He further states that " * * * it may be safely predicted that the time will soon arrive when, in discussing the nature of bacterial cultures isolated from infected tissues or maintained in laboratory

stocks, it will not be sufficient merely to name the organism * * * for it is becoming increasingly clear that we shall never know what a bacterial species really is until we acquaint ourselves with the outermost limits of its variability * * * not merely its 'normal' vegetative form but all of its dissociated types or cyclogenic stages as well * * *. The truth we shall eventually come to, however, is that the free-living microorganism is potentially a kaleidoscopic thing, in which the power of responding successfully to a changing environment by alterations in body state, both morphologic and biochemical—and even by self-destruction, if need be, in order to generate another and more stable type—stands as its one most important attribute."

An organism removed from its customary environment and confined in tubes for years acquires stability. It is such "domesticated" cultures which have been used in classifying bacteria. Cultures, when first secured from their natural habitat and placed upon the ordinary media, possess great potential variability. Each apparent species has a group of satellites to which we have been so unwise as to attempt to assign a definite place in the classification. Classification is not the important thing. What we should know is how the various types have been formed. "* * * Although we may not learn how to create a 'species,' there is no class of organisms more favorable than bacteria for studying the possible influence of environment in determining the trend of hereditary variation."

The author suggests that what he calls "our vain attempts to perfect schemes of classification" be abandoned and that "* * * a somewhat new branch of bacteriological study in which we shall strive to recognize bacterial species relationships * * * by a study of all the various types or stages comprising the cyclogeny of the species in question * * *" be substituted. He believes that it is only in this way that we shall "be able to recognize the bacterial species in its entirety."

The best way to attack the problem, in the opinion of the author, is from the viewpoint of microbic dissociation. By this he means "an attempt to recognize and study cultures arising from the two chief colony types, S (mother colony) and R (daughter colony), together with such intermediates (O) as may be observed."

Advice is given against attempting to delve too deeply into the problem at first, although some success has attended the efforts of those workers who have attempted "to solve the problem from the bottom up."

Studies have been made by various bacteriologists on *B. coli*, the diphtheroids, the Pasteurella, *B. proteus*, *B. diphtheriae*, the streptococci, the pneumococcus, *B. typhosus*, *B. enteritidis*, the cholera

vibrio, and on Friedlander's bacillus, which show to some extent "how, in what sequence, and under what conditions of environment, cyclogenic variations have been and can be produced."

Another field in which the author believes microbial dissociation may be of importance is in connection with the rickettsial bodies. Study of these bodies has lent support to the theory that they are related to the better known bacterial forms and suggests "that the typhus fever rickettsiæ may be a dissociated stage of the proteus organism."

Already knowledge of dissociative reactions throws some light upon certain serologic and immunologic phenomena. It makes clear the inconsistencies, explains the limits of usefulness of many serologic reactions in diagnosis, and "presents the most tangible basis for an understanding of the confusing data that have gathered about the subject of 'double' and 'single' antigens, as well as the 'major' and 'minor' agglutinins." It may explain the mode of action of the bacteriotropic antibodies; the mode of action of hyperthermia in infectious disease; the cause of relapses. It may cause a change of view regarding "carriers," and the rise and decline of epidemics.

In conclusion, Hadley says: "And, finally, if for a moment we abandon ourselves to speculation, though not perhaps without some evidence in fact—it may eventually be demonstrated, not that a foreign filtrable virus gives rise to dissociation and to autolysis in the d'Herelle sense; but, on the contrary, that the fundamental physiologic reaction, of which both microbial dissociation and transmissible autolysis are only different modes of expression, gives rise to the filtrable virus."

BACTERIOLOGICAL NOMENCLATURE

The State of Connecticut Health Bulletin, in its February, 1927, issue, publishes a brief paper by F. L. Mickle in which he calls attention to the confusion caused by the constantly changing names given to various forms of bacteria and related organisms.

In the past few years an attempt has been made to get away from the incorrect classification based purely upon the microscopical appearance of the various organisms. With an increase in knowledge of the biologic characteristics of bacteria it has been found necessary to divide them into numerous genera depending upon differences in these characteristics.

In 1917 a committee of the Society of American Bacteriologists reported a new system of classification. Recently Professor Bergey, of the University of Pennsylvania, with the assistance of the committee, has issued his "Manual of Determinative Bacteriology," in which are given the generally accepted names of organisms, based

upon the new system. Attempt has been made to trace each organism back to its first authoritative description, to assign names which will place the organisms in the classes in which they really belong and to give credit to the discoverer of the organism by including his name in the title.

A list of names of bacteria and related organisms which commonly occur in reports sent out by the Connecticut Bureau of Laboratories is given below. The common name, new official name, and the abbreviation of the official name are given.

Common name	New official name sponsored by the Society of American Bacteriologists	Abbreviation of official name
Anthrax bacillus or <i>Bacillus anthracis</i>	<i>Bacillus anthracis</i>	<i>B. anthracis</i> .
Colon bacillus or <i>Bacillus coli</i>	<i>Escherichia coli</i>	<i>E. coli</i> .
Diphtheria bacillus or <i>B. diphtheriae</i>	<i>Corynebacterium diphtheriae</i>	<i>C. diphtheriae</i> .
Dysentery bacillus (Flexner type) or <i>Bacillus dysenteriae</i> Flexner.	<i>Eberthella paradysenteriae</i>	<i>E. paradysenteriae</i> .
Dysentery <i>Bacillus</i> (Shiga type) or <i>Bacillus dysenteriae</i> Shiga.	<i>Eberthella dysenteriae</i>	<i>E. dysenteriae</i> Shiga.
Enteritidis bacillus or <i>Bacillus enteritidis</i> .	<i>Salmonella enteritidis</i>	<i>S. enteritidis</i> .
Glanders bacillus or <i>Bacillus mallei</i>	<i>Pfeifferella mallei</i>	<i>P. mallei</i> .
Gonococcus.....	<i>Neisseria gonorrhoeae</i>	<i>N. gonorrhoeae</i> .
Meningococcus.....	<i>Neisseria intracellularis</i>	<i>N. intracellularis</i> .
Paratyphoid A bacillus or <i>Bacillus paratyphosus</i> A.	<i>Salmonella paratyphi</i>	<i>S. paratyphi</i> .
Paratyphoid B bacillus or <i>Bacillus paratyphosus</i> B.	<i>Salmonella schottmuelleri</i>	<i>S. schottmuelleri</i> .
Straphylococcus (genus).....	<i>Straphylococcus</i>	<i>Staphylococcus</i> .
Streptococcus (genus).....	<i>Streptococcus</i>	<i>Streptococcus</i> .
Syphilis organism or <i>Treponema pallidum</i> .	<i>Treponema pallidum</i>	<i>T. pallidum</i> .
Tetanus bacillus or <i>Bacillus tetani</i>	<i>Clostridium tetani</i>	<i>C. tetani</i> .
Tubercle bacillus.....	<i>Mycobacterium tuberculosis</i>	<i>M. tuberculosis</i> .
Typhoid bacillus or <i>Bacillus typhosus</i>	<i>Eberthella typhi</i>	<i>E. typhi</i> .
Vincent's fusiform bacillus.....	<i>Fusiformis dentium</i>	<i>F. dentium</i> .
Vincent's spirillum.....	<i>Borrelia vincenti</i>	<i>B. vincenti</i> .

NOTE.—Elsewhere in this section attention is called to the subject of "Microbic Dissociation," study of which shows that classification is not the most important part of bacteriology; and, in the light of new data regarding dissociation gathered from time to time, will necessarily be subject to modification. It is important, however, that the classification accepted at any one time be known; otherwise, it is difficult to understand much that is appearing in the current periodicals.

CARBON DIOXIDE IN HICCOUGH

Current Researches in Anesthesia and Analgesia, the organ of the International Anesthesia Research Society, in its issue for February, 1927, contains a short paper by Russell F. Sheldon, M. D., assistant anesthetist at the Massachusetts General Hospital, entitled "Experiences with carbon dioxide in hiccough."

Carbon dioxide is known to have a stimulating effect upon the respiratory center, especially in the strength of about 5 per cent, mixed with air or oxygen.

Hiccough is a spasmodic contraction of the diaphragm and an interruption in the normal respiratory cycle.

The author asks the questions: "Is it possible that by the use of carbon dioxide the respiratory center can be so stimulated in its normal function that these abnormal impulses can have no effect upon it, and that hiccough will be impossible? If this be possible, will the effect be lasting?"

No attempt is made in this paper to answer these questions, but reports of four cases in which carbon dioxide was used to control hiccough are given, and speak for themselves.

The first case was that of a man, aged 51, who had six days of constant hiccough, with vomiting, following the removal of a gangrenous appendix. He was in a very serious condition from lack of rest and sleep, and several consultants were of the opinion that his chance of recovery was dependent upon the cessation of the hiccough. Carbon dioxide inhalations were given for various periods of time and after varying intervals, for three days, after which there was no more hiccough. The patient then had a normal convalescence.

The second patient, a man, was seen 11 days after cholecystectomy, at which time he was having a convulsive hiccough with every breath. He was given 4 per cent carbon dioxide with 96 per cent air. Hiccough ceased, only to return after an interval. Further inhalations were given with good results, except in two instances when they seemed to have no appreciable effect. Later the patient vomited copiously and the hiccough stopped. Whether or not the carbon dioxide was really useful in this case seems doubtful.

The third case was that of a man, 52 years of age, who started hiccoughing and vomiting nine days after a gastric resection. The next day a secondary operation was performed, but no cause for the hiccough could be found. The usual remedies were tried without success, after which carbon dioxide inhalations were given. An ordinary face inhaler was used and the gas was given in the proportion of 10 parts to 90 parts of oxygen. This was kept up for about eight minutes, following which there was freedom from hiccough for two hours. The hiccough then recurred, but gradually ceased, and the patient recovered. In this case it was thought that the carbon dioxide played a definite part in the recovery.

The fourth case was one of hiccough during anesthesia. A boy, aged 12, was being operated upon under nitrous-oxid-oxygen-ether anesthesia. Hiccough came on. One of the oxygen tanks was removed and 25 per cent carbon dioxide substituted. The depth of respiration increased greatly and after eight breaths the hiccough stopped.

Tanks of carbon dioxide are usually available and the use of the gas under properly controlled conditions is without danger. It might well be worth trying in cases of prolonged and intractable hiccough.

DIATHERMY IN PNEUMONIA

In the Proceedings of the Royal Society of Medicine for October, 1926, H. E. Stewart reports on a series of between 300 and 400 cases of pneumonia in which diathermy was used as an adjunct in treatment.

It was found that in about 97 per cent of the cases treated the temperature fell by lysis, this in many cases beginning on the second or third day.

The circulation was benefited early, as shown by a marked lessening of cyanosis, especially when the left lower lobe is involved. The author attributes this to an increased respiratory excursion due to relief from pain, and secondly, to an improvement in the intrapulmonic circulation around the consolidated area.

As a result of the same factors, the respiratory rate was decreased about five per minute.

Pain being relieved, the patients were able to sleep, and thus build up their power of resistance.

Under the method used, the extension of the pneumonic process seemed to be about the same as with other forms of treatment, but, with improvement in technique, it is hoped that extension may be materially reduced.

Perspiration was greatly increased by diathermy, probably with increase in the elimination of toxic substances.

As a complication, empyema developed in about two-thirds the number of cases in which it would be expected if untreated.

The treatment has not resulted in a sudden termination of the disease, but resolution has been hastened, in a few cases so rapidly as to cause alarm because of toxic absorption.

The author recognizes that the mortality rate in epidemics varies greatly, therefore he is hesitant to ascribe much effect in this respect to diathermy. He does show, however, that the death rate was about halved in four series of treated cases and controls in the hands of different men. The average mortality in his series, over a period of four years, is 12.9 per cent. This includes all types of the disease, including streptococcus pneumonia, and all degrees of illness, every patient who lived long enough to receive two treatments being included. Among the cases treated and now living were 42 for whom

hope had been abandoned by the attending physicians. There were but two recorded deaths in the entire series of patients in whom diathermy was used before the third day.

ANSWERING EXAMINATION QUESTIONS

Frequently in these pages attention has been called to the advantages to be gained by acquiring ability to express oneself clearly in writing. The objects of this have been to encourage medical officers to write for publication—particularly in the *BULLETIN*—and to make less work for the editor when papers are accepted.

One advantage of being able to write well—not so obvious, but very practical—is connected with written examinations.

Surgeon Commander H. B. Hill, Royal Navy, has written a paper on this subject, entitled "On writing answers to questions in examinations on medicine," which was published in *Journal of the Royal Naval Medical Service* for January, 1927.

Commander Hill states that his paper is simply a collection of facts that he has never seen brought together, and he does not consider the mistakes to which he calls attention as being due to ignorance so much as to want of experience in writing. He has for some years been connected with a "coaching college" in London and has, therefore, had abundant opportunity to detect mistakes of this kind.

The first mistake mentioned by the author is the common one of misreading the question and, consequently, supplying an answer which may be all true but which does not answer. As an example, the question, "A patient has an acute sore throat. How would you deal with the case?" is altered in the mind of the person being examined to "Treatment of acute sore throat." Of course, this is not what the examiner wanted.

The word "discuss" is pointed out as the cause of much trouble. It means "to examine a topic in disputation with another, with a view to arrive at the truth about it," and "disputation" means "a contest in argument on opposite sides of a question." Too often only the symptoms are given when one is told to discuss a disease. On the other hand, when one is told to discuss the symptoms or the differential diagnosis of a disease, one should not attempt to tell all one knows about the disease.

"Muddling the answer" is next discussed. Lucidity in the answer is most important. Hill advises his students before answering the question to ask themselves, "Would this answer, if read out in a court of law, prove the existence of this disease in a patient?" This method will bring to mind many points which might be omitted from a hurried, rambling answer.

Saying that the apex beat is displaced is quite different from saying that the heart is displaced, yet this error is frequently made.

A common mistake is to make the quarantine period after contact with an infectious disease shorter than the incubation period. In practice, this might be a fatal error.

"Incomplete answers" are frequent. When asked to locate the lesion in a case of facial paralysis, only one variety, that due to a lesion outside the stylo-mastoid foramen, often is considered. In discussing the effects of pediculi on the human body, the diseases transmitted by these parasites are often omitted. Frequently the use of the exploring needle in pleurisy is not mentioned. Prescribing two drugs which together might cause death is not an uncommon error in answers.

Many poor answers are due to lack of reading. As examples of these the author mentions the usual vagueness as to physical signs and symptoms of aneurysm of the aorta in various locations; the unsatisfactory answers to questions concerning diabetes, dyspnea, uremia, and insanity; and the lack of knowledge of the newer tests for and treatment of the contagious diseases. One should, in order to make a good showing in an examination, not only read text-books but keep up with the current medical literature. The advances in medicine are found in the latter long before they become incorporated into the former.

Questions on treatment "should be answered as if writing instructions to an unqualified nurse who was to be left in charge." Treatment for delirium, constipation, pyrexia, and insomnia in pneumonia, as described in examination papers, is almost always vague. According to Hill, " * * * two of the most formidable complications of pneumonia are the indiscriminate use of calomel and morphia."

Where several questions are given at one time it is wise to answer the ones one is sure of first, so as not to run the risk of having to leave some questions unanswered, or only partially answered, because so much time has been used in puzzling over some subject with which one is not entirely familiar.

Description of the "early" symptoms of diseases is often neglected. Diet forms a stumbling block to many. Answers concerning this should be specific.

The examiner is prejudiced unfavorably when he reads a paper in which slang phrases are used instead of more formal English. For example, do not use "knock off" for forbid, in reference to articles of diet. "Slops" and "slop diet" should be avoided. These are terms rarely used in the United States, but the author states they are not infrequently found in examination papers in England. One

paper examined by him contained "knock off his chops," at the end of one sentence. The next sentence began, "put him on slops." He found it difficult to rid his mind of this jingle, probably to the detriment of the chances for passing of the person being examined.

While these same mistakes are not often found in the papers of medical officers undergoing examinations, mistakes equally unnecessary do occur. If all medical officers will consider carefully the question before attempting to answer it, many mistakes will be avoided. If they will express their answer in clear, concise sentences, their chance of attaining a satisfactory passing grade will be materially improved.

MEDICAL ETHICS

In the Journal of the American Medical Association for February 26, 1927, Dr. Arthur Dean Bevan writes on "The need of teaching medical ethics." An abstract of this valuable paper, prepared by that journal, follows:

Arthur Dean Bevan, Chicago, says that with the great advances of modern medicine and the greater range of application of medical and surgical therapy, there has developed a greater opportunity of misusing the sacred privileges of the physician and surgeon. The time has arrived when the organized profession, i. e., the American Medical Association, should take steps to do everything in its power to correct such evils as exist and to educate medical students and the profession in the importance of sound ethics and practice. The "Principles of Medical Ethics" of the American Medical Association is an admirable short presentation in three chapters of: The duties of physicians to their patients; the duties of physicians to each other and to the profession at large; and the duties of the profession to the public, concluding with a short summary of the principles involved. The "Principles" are published by the American Medical Association and distributed to the profession. An effort is made to provide each medical student with a copy at graduation. In the next revision of the "Principles of Ethics," Bevan suggests elimination of the conception, at least the implied conception, that a physician has a certain ownership in a patient by virtue of the fact that the patient has consulted him. It should be made perfectly clear that such an ownership does not exist, and that the patient has a perfect right to consult any physician he desires. In the last 50 years, he continues, the practice of medicine has become more and more surgical. As a result, new operative procedures have been developed and perfected, and thousands of people have been relieved or cured by properly indicated and properly performed operations. Fees for operations have become a larger and larger part of the profession's income. This great increase in surgical procedures has brought with it two new and serious problems; i. e., the doing of some unnecessary operations, and the performance of operations by men who are relatively incompetent. The great majority of operations done are desirable and necessary and are done by medical men competent to do them; on the other hand, many operations are done which may not be necessary, and many are badly done by incompetent men.

The medical student and the practitioner of medicine should be taught that when he undertakes the treatment of a patient he makes a contract with the patient, that is legally binding, to give the patient the benefit of the knowledge possessed by the "professors" (the men who profess to be medical men) of the science and art of medicine in the place and at the time the services are rendered. It is, therefore, part of sound medical ethics for the physician to make himself competent. He is also bound to give his patient the benefit of good judgment, and sound medical ethics requires that in his dealing with his patient he must be governed by the golden rule. He should never do an operation on a patient which he would not want to have done on himself under the same circumstances. The three absolutely essential requirements of the medical man are honesty, good judgment, and scientific training; and the greatest of these is honesty. Speaking of the division of fees, Bevan says: "I believe that the evil is diminishing. It is, however, still a common practice in some localities and should be eliminated by drastic measures. It is a matter which from the standpoint of either medical or general ethics is not open to argument. The medical man who deceives his patients by some scheme of division of fees might just as well pick his patients' pockets. This practice should be done away with by the teaching of sound medical ethics." Of prohibition he has this to say: "Another problem which must be solved by sound medical ethics has been left on the doorstep of the profession by prohibition. From the standpoint of personal hygiene and public health, legislation has never been passed that has such possibilities for good as has the prohibition amendment. Prohibition has accomplished an enormous amount of good, and with better enforcement can accomplish much more for the health and welfare of our people. The medical profession, as a whole, recognize this fact, and support the constitution and the amendments. On the other hand, a noisy active minority of the medical profession are taking advantage of certain provisions of the amendment and selling their souls for a mess for pottage. The government regulation permits a physician to prescribe 100 pints of whisky to his patients every three months, or 400 pints a year. In addition, he can secure 12 pints of whisky and 5 gallons of pure grain alcohol each year to be used in his office work. The 5 gallons of pure grain alcohol does not have any special value as a sterilizing agent or as an external application over denatured alcohol, which can be purchased for a small cost. This could be used, and is used, largely as a beverage. Previous to the time of the Volstead Act honest physicians in general practice never prescribed 100 pints of whisky to their patients in a period of three months. I have practiced medicine for many years and I have never prescribed whisky except to a patient threatened with delirium tremens to tide him over, and I have not had a case of delirium tremens in my work since prohibition has been in force. This problem has become a serious one because, in the propaganda against prohibition, a well organized group in the profession, in spite of the liberality of the Government in regard to the amount of whisky which the medical man can prescribe for patients, has taken the position that the amount should not be limited and the physician should be permitted to prescribe any amount which he deems necessary." Is this not a case for the application of sound medical ethics? The members of the American Medical Association and its constituent societies should study the existing state of facts in the practice of medicine and write a new principle to meet the new problems that have arisen in this evolution of medical practice. What is the best way to teach medical ethics to medical students and the profession? It will not do simply to hand out to each student when he graduates a copy of the "Principles of Medical Ethics." It will not do to publish a paper

on this subject every few years. We must place modern medicine on a sound ethical basis. We must eliminate the unethical things in practice, wherever and whenever they creep in. The remedy lies in the education of the profession and of the public. This means an educational propaganda carried on not one day a year but throughout the year, and year after year, by the organized medical profession, the American Medical Association, through its great journal, its bureau on health and public instruction, and its council on medical education. This same work can be carried on in each State by the State societies and their journals. The first-class medical schools of the country should teach their medical students sound medical ethics by lectures, precept, and example. The national special societies, such as make up the Congress of Physicians and Surgeons and the American College of Surgeons, should all do their part in this great educational campaign.

ALCOHOLIC CONTENT OF BRAIN

Medical officers of the Navy are frequently called upon to express their opinion as to whether or not a man is under the influence of intoxicating liquor. That it is not always easy to determine the question is a well-known fact. No chemical test has yet been devised which will show the degree of intoxication in an individual and it is still necessary for us to rely upon a study of the suspect's appearance, demeanor, and response to stimuli to arrive at an opinion as to his state of sobriety or drunkenness.

In an endeavor to determine the cause of intoxication and to arrive at some means of determining its degree, Alexander O. Gettler, Ph. D., and Arthur Tiber, B. S., of the Chemical Laboratories of the Pathological Department of Bellevue and Allied Hospitals and the chief medical examiner's office of the city of New York, have analyzed during the last five years more than 6,000 human brains for their alcoholic content. They have published the results of their study in *Archives of Pathology and Laboratory Medicine* for February, 1927.

While the method employed by these workers can not be used in the living subjects, it has enabled them to reach certain definite conclusions, which might be of value in medico-legal matters and which seem to show what constitutes intoxication.

Among the more than 6,000 brains examined were those of persons who in life had been total abstainers, occasional, mild, and habitual drinkers. The investigators found, from a study of the history of these persons, that the effect produced by alcohol in all, whether abstainers or habitués, is proportional to the amount of alcohol present in the brain.

As is well known, not all persons are affected similarly by the same amount of alcohol consumed. All with the same amount of alcohol in the brain are, however, affected alike. The person with

the greater tolerance has acquired the power to oxidize alcohol more rapidly, so that not so much of it reaches the brain. The part that escapes oxidization accumulates in the brain and affects all alike.

The conclusions reached by the investigators follow:

1. For the qualitative and quantitative determination of alcohol, the brain is of first importance.
2. The normal alcoholic content of human brain material is less than 0.0025 per cent.
3. The alcoholic content of the brain in persons who have partaken of alcoholic beverage ranges between 0.005 and 0.6 per cent.
4. All patients having an alcoholic content below 0.1 per cent (our designation of "one plus") show no abnormal physiologic effects.
5. Patients with an alcoholic content above 0.1 per cent and up to 0.25 per cent (designated as "two plus") show some physiologic disturbance, as evidenced by increased aggressiveness, and more or less loss of the sense of care. None of these patients, however, shows unbalanced equilibrium, which is commonly called intoxication.
6. When the alcoholic content rises above 0.25 per cent and up to 0.4 per cent (designated as "three plus"), and still higher to 0.6 per cent ("four plus"), the equilibrium of the person becomes unbalanced—a condition generally known as intoxication.
7. The degree to which any person is affected does not depend on the quantity of alcohol consumed, but on the amount of alcohol present in the brain at the time.

ELECTRIC SHOCK

Experiments to determine the cause of death in electric shock and the best method of preventing a fatal outcome were conducted by R. W. Ian Urquhart, M. A., M. B., of the Laboratory of Physiology of the University of Toronto, and reported by him in the April, 1927, number of the Journal of Industrial Hygiene. Because of the difficulty of causing fibrillation of the heart in rabbits these animals were used.

A review of the literature on the subject of electric shock gave the author an indication of the cause of death. Higher voltages have a selective action on the respiratory apparatus, while lower voltages act more directly upon the heart, causing fibrillation. In the former cases artificial respiration is frequently of value; in the latter, of no value.

Much depends upon the course traveled by the current, and it is impossible to say whether or not the heart will be affected when the current passes through the length of the body. For this reason Urquhart applied the electrodes in such a way that the current was forced to pass through the vital centers of the brain. After determining the condition under which death might be expected to occur,

the effect of artificial respiration upon animals subjected to these conditions was studied. Artificial respiration was applied in from one to five minutes after the current was stopped and was kept up until recovery or death occurred. In 25 cases recovery took place; in 5 cases the rabbits died. One-third of those which recovered made their first attempt at voluntary respiration within two minutes after the shock. Others were considerably later, one showing no response until 12 minutes had elapsed. In the five cases which did not recover examination showed that gross damage had been done to the spinal cord and medulla.

Next, the effect of measures other than artificial respiration was studied. "Countershock" has been advocated as a part of the treatment, because it has been noted in practice that men who fell some distance after being shocked were more readily resuscitated than those who had no such fall. Evidence was found which confirms the recent work of Campbell and Hill, showing that "countershock" is of no real value.

In summarizing the results of his experiments, the author says:

The initial effect of the passage of the alternating current through the brain is intense stimulation of all the centers in its path. There is a generalized muscular contraction which, together with a pronounced vasoconstriction, results in a great accumulation of blood in the venous side of the circulation. The stimulation of the vagus center causes inhibition of the heart, an effect which, to a large extent, can be obviated by section of both vagi * * *.

When the current is broken, this period of stimulation is followed by a period of profound inhibition or paralysis of all these centers * * *.

That this paralysis may be only temporary is shown * * * by the fact that artificial respiration brought about recovery in all cases in which no gross damage to the brain or the spinal cord had been done by the heat generated at the point of application of the electrodes * * *. With the return of consciousness all the reflexes return, and in the majority of instances there is an interval of only a few seconds between the initial breath and their return * * *.

It seems, therefore, safe to conclude that it is the nerve centers themselves that are paralyzed by the passage of the current, so that impulses reaching them are completely blocked and the normal rhythmic discharge of the respiratory center ceases. This explains the failure of counterstimulation as an aid to resuscitation. It also explains the failure to obtain reflex vagal inhibition of the heart in shocked animals. It is only after the application of artificial respiration with efficient aeration that the inhibition can be observed to pass off. Furthermore, it is exceedingly important that artificial respiration be commenced early and be maintained for a sufficient length of time.

The conclusions reached are as follows:

1. The experiments herein described confirm the deductions of previous observers as to the cause of death in electric shock, namely, that it may be due to primary cardiac failure, to primary respiratory failure, or to a combination of both.

2. In laboratory animals, when the current traverses the body from the head to a hind limb, about 45 per cent of the deaths are of purely cardiac origin. The remainder of the deaths occur because of failure of the respiratory movements.

3. In these, as in the group in which the current is passed directly through the brain, a condition of profound paralysis or block becomes established in the respiratory, vagus, and vasomotor centers.

4. That the block involves these centers is shown by experiments which demonstrate clearly the absence in electrocuted animals of reflex effects normally functioning through them. Since the nerve centers become insensitive to extraneous influences, counterstimulation is not an aid to recovery.

5. No definite histologic changes can be made out in the brain to account for the symptoms. The capillary hemorrhages which occur do not appear to be significant.

6. The foregoing experiments also show definitely that when the electric current does not cause charring of nerve structures the paralysis or block is recovered from and the reflexes return, provided efficient artificial respiration is applied.

7. It is of the greatest importance that artificial respiration be applied early and be maintained for a sufficient length of time. Owing to the nature of the block in the nerve centers the ordinary tests for death should not be accepted and "nothing less than cooling of the body or the onset of rigor mortis should be considered to be evidence of death."

ACID AND ALKALI BURNS

Burns by acid and alkali are not of extreme rarity in the naval service and, when they do occur, frequently result in the loss of many days from duty on the part of the persons so burned. For this reason a paper entitled, "The treatment of acid and alkali burns," by Edward C. Davidson, M. D., of Detroit, which was published in the April, 1927, number of *Annals of Surgery* is of much interest.

Doctor Davidson conducted a series of experiments with rats, in which he observed the effects of various concentrations of acids and alkalies applied to the skin of the animals. For each concentration, three groups of rats were used. In one group the excess of the caustic was wiped away with cotton. This formed the control group. In the second group, neutralization of the acid with 5 per cent sodium bicarbonate and of the alkali with 1 per cent acetic acid was affected. In the third group treatment consisted of washing the part with water. The rats were then placed in cages and nothing further done for them.

Contrary to the general belief in the efficacy of neutralization of the caustics as a means of preventing severe damage from such burns, Davidson found:

1. Concentrated mineral and organic acids react with skin promptly. As the dilution of the acid increases there is a striking prolongation of the latent

period. Concentrated hydrochloric acid is a much less vigorous caustic than either concentrated nitric or sulphuric acids. There is some evidence to suggest that trichloroacetic acid is absorbed like phenol and acts as a general protoplasmic poison.

2. Sodium and potassium hydroxide react with skin only after a prolonged latent period.

3. The results obtained in the treatment of experimentally produced alkali and acid burns were decidedly better when the caustic agent was removed by dilution with water than when rendered inert by neutralization.

4. When treatment by neutralization is employed, it should only be used after the maximal amount of the caustic has been removed by thorough washing.

ANTISEPTICS AND THE NASAL FLORA OF RABBITS

The American Journal of Hygiene (7: 2; March, 1927) contains a paper by Carroll G. Bull and G. Howard Bailey entitled, "The effect of antiseptics on the nasal flora of rabbits," in which they show that the commonly used antiseptics are of no value so far as the removal of pathogenic organisms from the nasal cavities of rabbits is concerned.

The dilutions of the antiseptics used were the same as those advised for their use on man. The antiseptics were instilled by means of a 1 cubic centimeter pipette, 0.2 cubic centimeter of each being used. In most cases treatment was given daily.

Of the rabbits used, 41 had snuffles, while 37 were free from this disease. Cultures were made from the nasal secretions before and after treatment. *Bact. leipsepticum* and *B. bronchisepticus* were the predominant organisms, *M. catarrhalis* and staphylococci occurring in a few cases.

The authors' summary and conclusions were as follows:

Solutions of mercurochrome, zinc sulphate, argyrol, phenol, dichloramine-T, acriflavine, crystal violet and brilliant green, allowed to run into the nostrils of rabbits, were devoid of beneficial influences, either in affecting the nasal discharges associated with snuffles or in removing pathogenic organisms.

Mercurochrome seems to cause *B. bronchisepticus* to disappear from the nasal secretions. Some of the other drugs, particularly dichloramine-T, crystal violet and brilliant green, caused a reduction in the number of the less pathogenic organisms, but this was accompanied by an increase of the more pathogenic ones.

Mercurochrome, zinc sulphate, argyrol, and phenol apparently caused no injury to the mucous membranes. Acriflavine seemed to be slightly irritant. Dichloramine-T, crystal violet, and brilliant green were definitely injurious, causing profuse nasal discharges. Pneumonia frequently developed following the use of crystal violet and rather regularly after the use of brilliant green.

These observations seem to eliminate the possibility of freeing the upper respiratory passages of rabbits of pathogenic organisms by treatment with antiseptic solutions. One could hardly expect to find a more promising anti-

septic than is acriflavine. It is at most only slightly irritating to mucous membranes and is a powerfully potent bactericide in the presence of protein substances, but it proved to be impotent as a nasal antiseptic. It is evident, on the other hand, that great harm can be done by putting irritating solutions into the nasal passages.

ANNAM SWELLING

Tropical Diseases Bulletin for January, 1927, contains an abstract of a paper by Normet, published in Bulletin de la Société Pathologie Exotique, in which is described a peculiar type of anemia with edema prevalent in Annam, and to which the name Annam swelling has been given.

The patients have more or less general edema, and ascites. There is muscular wasting. Anemia may be extreme; in some cases red cells are reduced to 600,000, and hemoglobin to 10 per cent. Cardiac and renal symptoms are absent. The fact that there are no nervous symptoms rules out beriberi. The patients are all members of the poorer classes and, while cases occur at all seasons, the greatest prevalence is during a time of shortage of food. The victims of this disease frequently appear fat and healthy, but emaciation is always found upon close inspection. They are dull, slow to answer questions, and have a vacant gaze. These symptoms, with the finding of diminished urea in the blood and urine, make the diagnosis. Arterial hypotension and a dry skin are usual features.

Calcium chloride diminishes the edema, but does not prevent death. Overfeeding does no good, as the food is not assimilated. The treatment used with success by the author consists of daily subcutaneous injections of glycocoll, 0.2 gram, in salt solution, for 10 days. This causes the edema to disappear and "the drug acts like a catalyser on the assimilation of nitrogenous substances." Formerly the mortality was 95 per cent. Under this treatment recovery in a few weeks is almost invariable. The anemia is slow in disappearing and, to overcome this, the author gives citrate of soda and iron and potassium tartrate, intravenously.

The victims of the disease among the agricultural population, whose food consists almost entirely of rice, number thousands.

In the same number of Tropical Diseases Bulletin an abstract of an article by Kérandel, in which he discusses the pathogenesis of Annam swelling, appears.

Kérandel says that some observers have attributed the disease to ancylostomiasis; others to malaria or beriberi; while Thiroux, in 1920, attributed the syndrome to an association of ancylostomiasis and malaria with syphilis. Kérandel himself stresses the significance of hereditary syphilis.

Most of the patients harbor *ancylostoma*, but not all cases can be explained by this, as in a few cases no *ancylostoma* can be found. The disease is most frequent between the ages of 12 and 31, which to the author renders it unlikely that it is dietetic in origin. Signs of inherited syphilis are found with great frequency in the patients. Among 51 cases tested, 83 per cent gave positive reactions. That syphilis plays an important part is shown by the results of treatment with "914." Mercury, however, is poorly tolerated.

In the discussion which followed the reading of this paper it was brought out that *ancylostomiasis*, malaria, and syphilis are prevalent in other parts of the French Colonial Empire, but that Annam swelling does not occur, and that it is probable that some part of the etiology is as yet unknown.

Because of its similarity to food deficiency diseases found in other parts of the world, especially in tropical countries, it seems reasonable to assume that this condition is simply another "edema disease," due to the lack of some special component in the diet.

THE METRIC SYSTEM

Much information concerning the metric system of weights and measures and many arguments favoring its adoption as the standard in the United States are contained in a paper by Aubrey Drury, director, All-American Standards Council, which appeared in the *Rotarian*.

It is brought out that English-speaking peoples—leaders in most advances—are practically the only ones who persist in using the crude and cumbersome "rule-of-thumb" measures.

The original yard is stated to have been the distance between King Henry's nose and the end of his thumb. The inch may have been the length of his knucklebone. Our foot is said to be the length of an English king's foot!

Naturally, standards based on such absurdities have long since ceased being used in scientific work even in this country, but their use for commercial purposes continues, and results in a lack of familiarity with the simple and sensible metric system which is in use elsewhere.

It is shown in Mr. Drury's paper that our clinging to this antiquated system is costing us millions of dollars annually; that a change to the metric system would be easy and simple; and that our failure to adopt the metric system is largely due to inertia on our part.

In the Medical Department of the Navy the metric system of weights and measures has been adopted, but physicians in civil life

still cling, very largely, to the old system of grains, ounces, and pounds. Even in the Navy many of our prescriptions are still written in the old way. It is the duty of our officers to use only the metric system and to do all within their power to indoctrinate their colleagues in civil life in its use.

Over 900,000,000 people use the metric system in their daily lives. In no case where it has been adopted has it been abandoned in favor of a return to another system. These facts speak eloquently in favor of its adoption by this country and Great Britain.

EYE TEST FOR HYPERSENSITIVENESS TO SERUM

In a paper entitled "The use of vaccines and sera in communicable diseases," by Ralph Oakley Clock, published in *Annals of Clinical Medicine*, December, 1926, the author, in his discussion of serum reactions, shows that the skin test commonly used to determine hypersensitiveness to serum is not entirely reliable, it having been shown at the Willard Parker Hospital, New York, that there is no correlation between skin tests and serum reactions.

As a substitute for the skin test, the author proposes the eye test as described by Park and Williams, which is apparently more reliable. The test is performed as follows:

A small amount of a 1 to 10 dilution of serum or antitoxin is instilled into the conjunctival sac. A severe conjunctival reaction indicates that a serum reaction may be expected if serum or antitoxin be injected. A solution of epinephrine hydrochloride will neutralize the reaction. The test is free from danger and is highly recommended, particularly in those patients who give a history of asthma or hay fever.

Should hypersensitiveness be indicated by the test, desensitization may be accomplished in the usual way, by fractional administration of serum in doses of 0.1 cubic centimeters subcutaneously, increasing the dose every 15 minutes.

RESEARCH ON PHARMACOLOGICAL PROBLEMS

The Committee of Revision of the Pharmacopœia of the United States of America, 1920-1930, has issued a statement showing the kind of research work which it desires carried on in preparation for the next revision of the Pharmacopœia, the eleventh. The introductory statement and list of subjects for research are given below.

Under the by-laws of the Pharmacopœial Convention, the executive committee of revision is "authorized to carry on research work and to make

preparations for the ensuing revision." With the "tenth revision" completed the committee has turned to this next task so definitely assigned by the convention.

As the first step all members of the general committee of revision were called upon for information concerning difficulties of the revision which, in their opinion, were not yet satisfactorily solved and for other suggestions for needed research within the scope of the Pharmacopœia.

The responses from those who had so arduously worked during the "tenth revision" for the perfection of the text revealed many yet unsolved questions, and these were studied and classified by the executive committee of revision in a conference held in New York City. That these selected subjects may be available for further consideration by the members of the committee of revision and by the many other research workers in the medical, pharmaceutical, and chemical fields, they are herewith published.

For convenience they have been classified under five divisions, each division having the direction of the corresponding members of the executive committee of revision, one member serving as chairman of the group. The divisions are as follows: (1) Therapeutics and pharmacology; (2) chemistry; (3) botany and pharmacognosy; (4) pharmaceutical formulas and processes, and (5) nomenclature, tables, and miscellaneous questions.

Additional copies of this list may be obtained by addressing the office of the general chairman (see below), and anyone desiring to undertake the study of one or more of the problems suggested or of assisting in one of the cooperative studies which are outlined is requested to address the chairman of the group having charge of that particular study or to write to the general chairman of the committee of revision.

It is very important that those undertaking these researches should indicate their intention to the committee of revision, that a record may be had of all proposed studies and that such assistance as is available may be extended.

It is understood, of course, that all such voluntary studies may be presented and published wherever and in whatever manner the author may desire, only that the facts may be available for consideration during the next revision.

E. FULLERTON COOK,

*Chairman of the Committee of Revision of the
U. S. Pharmacopœia, Tenth Revision,
636 South Franklin Square, Philadelphia, Pa.*

THE U. S. P. COMMITTEE ON THERAPEUTICS AND PHARMACOLOGIC RESEARCH

H. C. WOOD, Jr., Chairman, and C. W. EDMUNDS, GEORGE W. MCCOY, and TORALD SOLLMANN

1. Iron citrate solution for hypodermic use. It is desirable to know the composition of commercial iron citrate solution sold for hypodermic use, and then to devise satisfactory standards for the solution.

2. Stainless iodine ointment. Is "stainless" ointment of iodine (as Ung. Iodi Denigrescens N. F.) equivalent to the U. S. P. ointment? The following should be studied:

- a. Determine absorbability of iodine through skin.
- b. Which ointment is best absorbed?
- c. Are the antiseptic qualities of the two ointments identical?

(Iodine Petroxolin, N. F., might also be included in this study.)

3. **Ointment of belladonna.** Is the U. S. P. X. formula suitable for absorption through the skin? Physiological tests should be made on human beings and on animals.

4. **Mercurial ointments.** It is desirable to study and report on the relative efficiency of mercurial ointments as made with different fatty bases. This study may advantageously be extended to other official ointments.

5. **Cimicifuga.** Is Cimicifuga therapeutically useful? A report is desired covering:

a. Opinions of clinicians who have used it.

b. Experimental clinical study.

6. **Gelsemium.** This drug has been dropped from the U. S. P. It has been suggested that it should be restudied for evidence of its therapeutic value.

7. **Lobelia.** A restudy of the therapeutic value of this drug is considered desirable.

8. **Cannabis.** Is this drug worthy of retention in the U. S. P.? If so, clinical tests should be conducted to indicate the comparative value of Indian and American Cannabis, and also the rapidity of deterioration in the drug and its preparations.

9. **Bacterial vaccines.** Which of these are worthy of U. S. P. recognition?

10. **Infusion of digitalis and tincture of digitalis.** A study should be made of the potency of the infusion and tincture of digitalis made by various methods.

11. **Cascara.** The U. S. P. X. demands that cascara be aged before use in medicinal preparations. This practice has been generally followed by manufacturers for a long time, but is it based on accurate information? If the literature does not reveal that tests have definitely proved the advantage of aging, it would be desirable to investigate the question.

12. **Oil of santal.** It is desirable that an investigation be made of the chemical and therapeutic properties of the commercial oils of sandalwood.

13. **The assay of veratrum viride.** A satisfactory bioassay for veratrum viride should be devised.

14. **The assay of ergot.** A study of the U. S. P. X. assay methods in comparison with other bioassay methods for ergot is recommended.

15. **The assay of digitalis, its preparations, and the digitalis groups.** The U. S. P. method for standardizing the heart tonics of the digitalis series should be further studied. One problem is the growing difficulty in obtaining frogs in sufficient quantity. Can a colorimetric or chemical method be devised to take the place of the biological method?

16. **Oleoresin of Male Fern.** A study of the biological and also chemical assay of Oleoresin of Male Fern is desirable, with a consideration of its introduction into the U. S. P.

17. **Biological assays.** All bioassay standards tentatively adopted by the Second International Conference on Biological Standardization should be tried in comparison with those of the U. S. P. X.

18. **Cod-liver oil.** The methods for determining the antirachitic value of this and other related oils are important, and U. S. P. workers should cooperate with other investigators in this field.

19. **Strophanthin.** Strophanthin, being a mixture of glucosides, varies in toxicity on frogs when tested by the U. S. P. method for heart tonics. Variations have been reported in strophanthin from Strophanthus Kombe of from 0.00,000,05 Gm. per gram frog (equal to ouabain) to 0.00,000,1 Gm. per gram frog. Is it desirable to include in the U. S. P. a biological test such as is given for strophanthus, allowing for a certain range?

The U. S. P. X. recognizes strophanthin from *S. Kombe* only. The question has been asked: Why not from *S. hispidus* also? They should be studied for comparison.

20. Pituitary solution. This solution is sometimes prepared with dilute acetic acid or other acid. This is not recognized by the U. S. P. X. Is acid necessary? If so, suitable limits should be set, but if not required the U. S. P. text should forbid its addition.

21. Ether and chloroform. Are the U. S. P. X. standards sufficiently rigid for the requirements of anæsthesia? The labeling of manufacturers would imply that such was not the case. As the medicinal use of both ether and chloroform is principally for anæsthesia, the U. S. P. specifications should recognize only the highest purity commercially possible. A commission of authorities should study this question.

22. Sulphur ointment. The use of petrolatum is suggested instead of lard in this ointment. It is claimed to produce a better appearing and smoother ointment, but will it be equally efficient therapeutically? This will require a clinical study.

23. Boric-acid ointment. Is the U. S. P. X. formula superior to that of the U. S. P. IX.? A number of clinicians should be invited to use these two ointments and report comparative results.

THE U. S. P. COMMITTEE ON CHEMICAL RESEARCH

H. V. ARNY, Chairman, with FRANK R. ELDRED, CHARLES H. LA WALL, W. O. RICHTMANN, and GEORGE D. ROSENGARTEN.

1. Tablets—Standards and assays. Methods for assaying pharmacopœial substances in tablets and general specifications for tablets should be established.

2. Cinchona assay. The specific details of the assay call for further study.

3. Colorimetric assay methods. A study should be made of standardized colorimetric assays for the accurate determination of minute amounts of alkaloids and other active plant principles in pharmaceutical products, such as:

a. The morphine content of paregoric.

b. The assay of digitalis.

4. Alkaloids. A further study is needed of the physical chemistry in the alkaloidal assay of drugs.

5. Assay of anthraquinone-bearing drugs. The colorimetric assay methods for anthraquinone drugs call for further investigation. Other proposed methods should also be studied, with the hope of providing a satisfactory assay.

6. A reconsideration of U. S. P. chemical tests in the light of the present knowledge of hydrogen ion concentration.

7. Electrometric titration of drugs containing alkaloids. To make this method more useful numerous titrations should be made and curves plotted from the results obtained.

8. Assay of aloe. A satisfactory method for the assay of aloe is needed. It may involve a new study of aloin and its reactions. No satisfactory process is now available.

9. Assay of oxgall. No satisfactory process is now available. There is evidence of considerable variation in oxgall as regards the glycochollates and "bile salts." What is meant commercially by "bile salts"?

10. Alkaloidal assays. A further study should be made of the methods suggested for the improvement of the alkaloidal assays of drugs and their preparations as given in the *J. A. Ph. A.*, Vol. I (1912), page 29.

11. **Capsicum and oleoresin of capsicum.** An assay method should be developed which would be more definite than the present organoleptic test.

12. **Chloroform liniment.** An assay process should be devised and a maximum and minimum standard adopted.

13. **Automatic devices for extracting alkaloids.** The methods suggested by the Bureau of Chemistry and claimed to be labor-saving and more accurate than those of the U. S. P. X. (see *Ind. and Eng. Chem.*, 17,612 (1925)) should be carefully tested, probably by a commission working on common samples.

14. **The assay of hyoscyamus and its preparations.** A further study of this assay (U. S. P. X.) is desirable.

15. **The assay of ipecac and its preparations.** A further study of this assay (U. S. P. X.) is desirable.

16. **Indicators for alkaloidal assays.** Work in the Bureau of Chemistry indicates that in some instances the indicators specified in the *Pharmacopœia* for alkaloidal assay do not give the correct neutral points. For example, methyl red and cochineal are not suitable for the cinchona alkaloids. This subject should be given further study.

17. **Glycyrrhiza.** A comparison of suggested assay methods is desirable, with a view of adopting an official method.

18. **The manufacture of spirit of ethyl nitrite.** A study of the methods of manufacture, especially with a view of greater stability, is desirable.

19. **The assay of sodium cacodylate.** The U. S. P. X. assay calls for further study.

20. **Differentiating tests for strong and mild silver protein.** A satisfactory chemical test is desirable. Those suggested should be studied and reported upon.

21. **Assay of alkaloidal salts.** This question should receive the immediate attention of the U. S. P. research committee. The majority of the alkaloidal salts of the U. S. P. contain water of crystallization. Many of these hydrated salts lose a portion of their water at relatively low temperatures. A notable example of this type is quinine sulphate, which loses all but about two molecules of water at 50° C. or even lower. In conducting the research on alkaloidal assays these facts will have to be taken into consideration.

Another point that will have to be carefully investigated is the indicators to be used. Methyl red is generally considered the most suitable indicator for alkaloids, yet with some alkaloids it apparently gives low results.

22. **Cresol.** The U. S. P. X. specifications for cresol call for a careful investigation, especially giving consideration to uniformity in their phenol coefficient.

23. **Solubilities.** The definition of the meaning of "very soluble," "freely soluble," "soluble," etc., in the U. S. P. X. is an advance in the direction of greater definiteness and precision. For practical purposes the degree of solubility is too indefinite. "Freely soluble," according to the definition, covers a solubility of from 1 to 10 parts. This is rather a wide range for this degree of solubility.

Such somewhat vague information is not in accordance with the other more precise figures for solubility occurring in the same paragraph. More precise statements of solubility will no doubt be appreciated by the users of the *Pharmacopœia*.

If it is not possible or practicable to give more precise solubilities instead of the solubilities conveyed by the descriptive terms, it is at least important to ascertain that the solubility of the various U. S. P. products in solvents now designated by "very soluble" or "freely soluble" does fall within the range understood by these terms. The first thing to do would be to classify the

chemicals for which the descriptive solubilities are given. This should be undertaken as a collaborative study, a number of laboratories taking part in the investigation.

24. **Lactic acid.** There is a need for a study of qualitative tests for lactic acid, with particular reference to testing for lactates in the presence of other organic acids.

25. **A study of the tests for caramel color.** There is a need for improvements in the tests for the detection of caramel coloring in liquids where it has been added illegally for the purpose of deception.

26. **Solution of epinephrine hydrochloride.** It is suggested that a dependable formula for 1 to 1,000 solution of epinephrine hydrochloride should be included in the U. S. P., giving the degree of acidity, the amount and nature of preservative, the amount and nature of reducing agent to keep the epinephrine from oxidation, etc. Some manufacturers are adding chlorobutanol or other substances as a preservative. This is not provided for in the U. S. P. X. and should either be permitted or excluded by tests. The keeping qualities of the solutions and dilutions therefrom should, of course, be determined by recognized methods of physiological assay.

27. **Arsenic trioxide.** A study should be made of its solubility in water, especially as to the influence of its physical form upon its solubility.

28. **Potassa sulphurata.** A study should be made of its decomposition on aging and the possibilities of stabilizers being introduced.

29. **Ammonium carbonate.** A further study on its composition is desirable, with particular reference to the manufacture of aromatic spirit of ammonia.

30. **Chlorinated lime.** It is desirable that there should be further study of the condition of its "active chlorine."

31. **The pepsin assay.** This assay calls for further study, providing, if possible, a more suitable substrata* than egg white and a more definite end point.

32. **The assay of volatile oils.** A study of the U. S. P. X. assays for the oils of eucalyptus, lemon, and santal has been suggested as desirable.

33. **Peppermint oil.** Positive tests should be devised for the exclusion of other peppermint oils which might be used as adulterants.

34. **Emetine hydrochloride.** Emetine hydrochloride (U. S. P. X.) is defined as containing "variable amounts of water of crystallization" and as losing "not more than 19 per cent (water) upon drying." This makes a very unsatisfactory standard, as it permits two products, one of which is only 81 per cent as active as the other, to be sold under the same designation. It is suggested that the article as found in commerce be investigated, with a view to more closely defining the amount of water the product should contain.

35. **Isopropyl alcohol test in whisky.** A new test should be devised; that in the U. S. P. X. will not indicate certain isopropyl alcohols now on the market which are free from tertiary butyl alcohol.

36. **Extract of malt.** The rate of deterioration should be studied and the assay improved, if possible.

37. **Microchemical methods.** What microchemical methods for the identification or assay of plant constituents are applicable to the Pharmacopœial texts?

THE U. S. P. COMMITTEE ON PHARMACOGNOSTIC RESEARCH

EDWIN L. NEWCOMB, Chairman, with W. O. RICHTMANN

1. **Microanalytical descriptions of vegetable drugs.** A restudy of all U. S. P. X. descriptions and terminology is desirable for the purpose of perfecting the text.

2. U. S. P. color standards and color nomenclature. This subject is one calling for an extensive investigation of a collaborative character.

3. Standards for the degree of fineness in powdered drugs. Further research is needed on the degree of fineness of powdered drugs best suited to yield the maximum of therapeutic values most economically and under varying conditions. This means the preparation of samples of known botanical characteristics, of specific degrees of fineness, and cooperation with pharmaceutical and assay groups. Work on percolation has heretofore been done with almost a complete disregard of the actual size of particles and the fundamental principles of osmosis.

4. Organic foreign material in vegetable drugs. Further research should be conducted on the organic foreign material in vegetable drugs for the purpose of adopting blanket standards for these impurities, as has been done for inorganic foreign material in the U. S. P. X.

5. Vegetable drug standards. It would greatly facilitate the work of the next U. S. P. revision if a report could be prepared containing recommended changes to bring about greater uniformity, scientific accuracy and completeness for the vegetable drugs of the Pharmacopœia.

6. Changes during the drying of vegetable drugs. It is desirable to determine the changes which take place in the therapeutic values of certain vegetable drugs from the fresh medicinal plant material to the dried drug. This would be possible through cooperative research with the medicinal men on the committee who are in a position to carry on clinical work and also with those who are in a position to carry on assay work. One of our more important specific drugs should be selected for intensive study along these lines.

7. The U. S. P. X. alcohol-soluble extractive method. There seems to be some danger of the U. S. P. X. method for alcohol-insoluble extractive giving consistently low results. Gum and balsamic resins contain volatile constituents that will be extracted during the alcohol-extractive determination. When this residue is being dried to constant weight at 110° C. the volatile constituents will pass off, together with a small amount of water that may be present in the drug. In the case of benzoin the volatile constituents are considered of therapeutic value, and preparations of this drug are often used as inhalants.

In the U. S. P. X. method for alcohol-soluble extractives the alcohol-soluble material is dried to constant weight, which, of course, is free from the volatile constituents of the gum resin.

The loss in five samples of benzoin extractive drug drying at 110° C., as directed by the U. S. P. X., was 2.1, 4.98, 3.4, 2.4, and 3.5 per cent, respectively.

The method should be modified to avoid this error, possibly through a check against the dry insoluble residue.

THE U. S. P. RESEARCH COMMITTEE ON PHARMACEUTICAL FORMULAS AND PROCESSES

WILBUR L. SCOVILLE, chairman, with GEORGE M. BERINGER and JACOB DINER

1. Compound mixture of glycyrrhiza. It has been reported that rapid decomposition of the ethyl nitrite occurs when using the U. S. P. X. formula for this mixture, gas being liberated and all ethyl nitrite being lost within 24 hours. The formula should be studied.

2. Defatting digitalis tincture. A test should be developed to prove that it has been defatted. Can some other solvent which is not so inflammable be used, such as carbon tetrachloride?

3. **Stability of pharmaceutical preparations.** This should be studied from the standpoint of two factors:

- a. Natural composition.
- b. External influences.

4. **Deterioration in drugs due to enzymes.** A study should be made of glucosidal drugs, with a view of preventing the action of enzymes and the deterioration in the drug during drying, storage, or transportation. Drugs suggested for this study are apocynum, convallaria, adonis, and chionanthus.

5. **Precipitation in pharmaceutical galenicals.** The causes and prevention should be given further study.

6. **The function and value of adjuncts to menstrua.** This is a subject worthy of scientific study in all pharmaceutical preparations.

7. **The extraction of vegetable and animal drugs.** The official methods and other methods should be compared and studied and their value determined.

8. **The effect of hydrogen ion concentration upon the stability of tinctures, fluid extracts, and extracts.** This is a new field of investigation and seems to promise the solution of some long-standing problems. The following specific illustrations suggest the possibilities:

Tincture of aconite.—The addition of about 2 per cent of acetic acid or 0.1 per cent of hydrochloric acid is suggested. Tincture of aconite rapidly deteriorates without such an addition.

Tincture of digitalis.—Experiments have been made with tinctures of digitalis adjusted to a variation in hydrogen ion concentration from $\text{pH}2$ to $\text{pH}10$. Excess acidity or alkalinity results in rapid deterioration, but no deterioration within two years was noted when the tincture was neutral. As normally made tincture of digitalis is not neutral.

It is doubtful if it is actually known what preparations are stable and what preparations are unstable to-day, and under what conditions these that are unstable deteriorate and to what extent. It is not so long since it was discovered that aconite preparations were unstable, and it does not seem at all improbable that a systematic investigation of the stability of other potent pharmaceutical preparations would bring other surprises. If this investigation could be undertaken in a systematic manner by the various universities and manufacturing laboratories it would be possible before the next revision of the U. S. P. to have rather thorough and complete information on the stability of many drug extracts and the condition under which they should be stored to assure the greatest possible stability.

A tincture of the drug under examination should be prepared by the usual method of extraction and its hydrogen ion concentration measured. It should then be adjusted by the addition of alkali and acid, respectively, to various hydrogen ion concentrations, both above and below that naturally encountered. A portion of this material should then be placed in small containers of alkali-free glass so that the periodic examinations may be made. The earlier examinations should be fairly close together, say every three months; later they can be extended to six-month periods and then to yearly. Preparations should preferably be kept under three conditions:

- a. In cold storage.
- b. At ordinary room temperature.
- c. Under temperature conditions which simulate summer heat.

Another portion of the preparation should be freed from all dissolved air by washing with nitrogen under vacuum and should then be adjusted to various hydrogen ion concentrations as above directed, bottled under nitrogen or

vacuum, but otherwise stored under the several conditions described for the first portion and observed at similar intervals.

Such a study would give definite information on the effect of temperature, air or oxygen, and hydrogen ion concentration on the stability of the preparation when in storage for varying periods of time. Investigations of this character already published on tincture of aconite and tincture of digitalis indicate the possibilities of such an investigation with other drugs.

9. **The preservation of U. S. P. drugs and preparations.** Another desirable study is the influence of light upon preparations now directed to be kept in amber-colored bottles. Also the influence of oxidation, hydrolysis, acid-reaction, heat (abnormal), temperature (normal), volatility, etc., the object being to insure better preservation of medicinal preparations and greater reliability. This would be primarily a check upon the present U. S. P. directions for preservation.

The following subdivision is suggested for this study:

- a. Oxidation and reduction (ferrous salts, phenols, aldehydes, etc.).
- b. Hydrolysis (tannins, sugars, glucosides, acetylsalicylic acid, etc.).
- c. Acid and alkaline reactions (pepsin, bismuth, glandular preparations).
- d. Catalytic decomposition (H_2O_2 , oils, fats, etc.).
- e. Light effects (galenicals, some alkaloids, phenols).
- f. Exposure effects rather than oxidation [CO_2 absorption, volatility, heat effects (normal changes, efflorescence, deliquescence, etc.)].

10. **Tincture of cantharides and its standardization.** The extraction of cantharides is difficult, as solvents for cantharidin are few. The best solvent and methods for extraction of cantharides, its preservation, and assay are deserving of further study.

11. **Solution of magnesium citrate.** It is claimed by some that the U. S. P. X. solution is too acid and also too strong. The entire question should be studied with the cooperation of clinicians. This should include the influence of (a) acidity and (b) strength on precipitation; the influence of the sugar content on precipitation through hydrolysis, the composition of the crystals which separate, a comparison of various solutions of magnesium citrate from the viewpoint of palatability, permanency, and physiologic action.

12. **Aromatic waters.** A study of the aromatic waters is desirable from the standpoint of the amount of oil dissolved under different conditions of manufacture, and with particular reference to a definite formula for making these preparations by distillation. (See J. A. Ph. A., Vol. IX (1920), p. 878.)

13. **Tincture of digitalis.** It is desirable to investigate the rate of deterioration to be expected in tincture of digitalis when prepared by U. S. P. X. formula, and also what methods may be adopted to overcome such deterioration. (See also the effect of hydrogen ion concentration on tincture of digitalis, question No. 8.)

14. **Ergot.** The effect of menstrua on the activity of ergot preparations should be studied.

15. **Fluid extract of cimicifuga.** It is suggested that this can be advantageously made with a lower alcoholic menstruum. Various alcoholic strengths should be tried.

16. **Extract of nux vomica.** A study should be made of the relative values of different acids in extracting this drug.

17. **Fluid extracts.** The fluid extracts of cinchona, ipecac, and squill present special problems in extraction, and both menstrua and methods of extraction should be studied.

18. **Resins.** There is need for the further study of the standardizing and assaying of these products.

19. **Tincture of cinchona.** The two official tinctures need study from the standpoint of extraction, preservation, and alkaloidal standard.

20. **Extract of cascara sagrada.** The U. S. P. X. basis for standardization is too variable. Some other should be devised; the extractive should be considered and other methods tried.

21. **Specific gravity and extractive (dry) of nonassayed fluid extracts and tinctures.** It is suggested that extractives should be taken by evaporating 5 cubic centimeters of the fluid in a shallow dish until most of the alcohol and water is expelled. Then dry for three hours in an oven at 100° C. Report in grams per 100 cubic centimeters.

THE U. S. P. COMMITTEE ON MISCELLANEOUS RESEARCH TOPICS

A. G. DU MEZ, Chairman, with THEODORE J. BRADLEY

1. **A study of U. S. P. nomenclature in the light of recommendations from the second Brussels conference (1925).** Those instances in which the U. S. P. X. is not in harmony with the recommendations of the Brussels conference (1925) should be pointed out that they may be available for consideration in the next revision.

2. **U. S. P. tables.** What other tables may be advantageously added to those now in the U. S. P.? If there are any to be recommended they should be prepared now and thoroughly tried in practice.

SYPHILIS NOT CAUSED BY VACCINATION

The statement which follows is self-explanatory.

It has come to the attention of the undersigned that false statements are being circulated, that have caused some people to believe or fear that vaccination against smallpox may cause syphilis. Since the activities under our charge furnish direct evidence in refutation of this idea, we have considered it our duty to issue a statement that syphilization as a result of vaccination does not occur.

Before the discovery of smallpox vaccine, the only protection against the dangers of smallpox was by inoculating a person intentionally with the disease and thereby producing, in general, a milder attack than that contracted when smallpox was caught in a natural manner. In this way the inoculation of syphilis along with smallpox, or even of syphilis instead of smallpox, was possible. This possibility also existed when vaccination first supplanted smallpox inoculation, and was performed, as was smallpox inoculation, from the arm of one human subject to another. Cases of syphilis following inoculation or vaccination with human vaccine were, nevertheless, extremely rare. Syphilis, however, is a disease confined in nature to the human species alone, and as soon as the use of calf vaccine instead of human vaccine became universal the possibility of transferring syphilis by vaccination was entirely done away with.

Since 1917 the United States Army has vaccinated approximately 4,700,000 members of its personnel; the United States Navy has vaccinated approximately 950,000 members of its personnel; and of these 5,650,000 persons *not one*

of them ever developed syphilis as a result of vaccination. In not one of them was there ever any suspicion of syphilis in connection with vaccination. During this same period the United States Public Health Service has also vaccinated 2,918,748 persons in carrying out its quarantine, immigration, and hospital work. While the service has not always had the opportunity of following up these vaccinations, as is carefully done in the Army and Navy, no one has ever alleged that any particular individual vaccinated by the Public Health Service has contracted syphilis as a result of vaccination.

During the past 10 years more than 2,000,000 persons, including school children, have been vaccinated by State and local health authorities in co-operation with the United States Public Health Service, making a grand total of 10,568,748 vaccinations recorded by the government medical services, and not one of the undersigned has ever received an allegation or a statement charging that any particular individual of this number has contracted syphilis as a result of vaccination. In fact, there has never been reported anywhere a case of syphilis attributable to vaccination following the use of bovine smallpox vaccine.

Smallpox vaccine is a standard medicinal product, the quality of which is prescribed by the United States Pharmacopœia and as such is subject to the provisions of the pure food and drugs law. Furthermore, smallpox vaccine, together with other vaccines and serums for human use, has been deemed of such importance by the Government that its production for sale within the jurisdiction of the United States has been under the special protection of an act passed July 1, 1902, antedating even the pure food and drugs law. Under this law all establishments producing smallpox vaccine for interstate sale must be licensed by the Secretary of the Treasury upon the recommendation of the United States Public Health Service, and the production is controlled by regulations drawn up by a board composed of the undersigned. These regulations provide for repeated inspections of the producing laboratories, for proper labeling, and for all safeguards which may be thrown about the making of such an important product. At present even the placing of the vaccine in the small tubes and the sealing of these tubes is required to be done in such a way that no hand, even through sterile, touches the vaccine. Repeated examinations of the product, for safety, are required.

This vaccine was used in the vaccination of the millions mentioned in the above table and is exactly the same as that used by doctors in private practice in the vaccination of the general public throughout the United States.

M. W. IRELAND,

Surgeon General, U. S. Army.

E. R. STITT,

Surgeon General, U. S. Navy.

H. S. CUMMING,

Surgeon General U. S. Public Health Service.

LINE OF DUTY

The letter which follows, while dealing with a specific case, states the opinion of the Judge Advocate General in regard to the question of "line of duty." It is quoted for the information of all naval medical officers, regular and reserve.

DEPARTMENT OF THE NAVY,
OFFICE OF THE JUDGE ADVOCATE GENERAL,
Washington, D. C., February 15, 1927.

From: The Judge Advocate General.

To: The Chief of the Bureau of Medicine and Surgery.

Subject: Van Kerrebroeck, Ernest, A. S., United States Navy.

Re: Origin of disability in the case of.

Reference: (a) Bu. M. & S., 1st End. of November 3, 1926, file P3-46635.

1. The above-named man enlisted in the United States Navy on August 19, 1926, no defects being noted on enlistment. On September 20, 1926, he was admitted to the sick list with diagnosis undetermined, which, on September 29, 1926, was changed to dementia præcox. The Board of Medical Survey was of the opinion that the disability was incurred not in the line of duty and not due to own misconduct, although there is no affirmative evidence to show that his disability existed prior to his entry into the naval service, nor that it was caused by conditions arising outside of the naval service.

2. It does not appear upon the facts submitted that there is any administrative action now to be taken by this department which requires a determination of the question whether disability in this case was incurred in line of duty. Formerly under the Navy regulations the character of a man's discharge on account of physical disability depended upon whether his disability was incurred in the line of duty, but at the present time it depends upon whether the disability was "due to his own misconduct." (Bureau of Navigation Manual, art. D-9101.) The absence of a man from duty on account of physical disability results under certain conditions in loss of his pay and the obligation to make good the time absent, provided that the disability was the result of his own misconduct. (U. S. C. title 34, sec. 183, act of July 1, 1918, 40 Stat. 717.) Formerly the payment of six months' death gratuity depended upon whether the death occurred in the line of duty (act May 13, 1908, 35 Stat. 128). However this was changed by the act of August 22, 1912 (37 Stat. 329), so as to make payment dependent upon whether the death was the result of the man's own misconduct, which is likewise the present law on the subject (U. S. Code, title 34, sec. 943, act June 4, 1920, 41 Stat. 824).

3. Under the United States Code, title 34, section 200 (act of March 2, 1907, 44 Stat. 1106), the Navy Department may be called upon to decide questions of line of duty, as that act provides that the Secretary of the Navy may in his discretion require the refund of enlistment bounty in the cases of men discharged during the first year of enlistment for "disability not incurred in line of duty;" and there are several statutory provisions affecting officers under which the question of line of duty becomes important in connection with the finding of examining and retiring boards. However, no question of line of duty is presented in this case under any of these statutes.

4. The allowance of pensions and of compensation under the World War veterans act depends in part upon whether the claimants suffer disability in line of duty. However, the Commissioner of Pensions under the direction of the Secretary of the Interior, in the one case, and the Director of the Veterans' Bureau, in the other, must determine for themselves all questions of law and fact arising in the case of claims under their jurisdiction, and it is neither necessary nor, in my opinion, desirable that the Secretary of the Navy make so-called decisions as to line of duty in the cases of naval personnel merely for the information of other officials who are not bound by his opinion and, in fact, not infrequently make contrary decisions of their own.

5. It is accordingly my opinion that the question of line of duty in this case should be reserved until such time, if ever, as it may be presented under circumstances requiring a decision thereof. As the matter now stands, I think the question whether or not the disability was incurred in line of duty is academic and, therefore, comes within the rule applied by this department in other classes of cases not to render decisions until required by some official action which must be taken under its jurisdiction.

E. H. CAMPBELL

Approved February 15, 1927.

CURTIS D. WILBUR

Secretary of the Navy.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,
UNITED STATES NAVAL MEDICAL BULLETIN,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

PREVENTIVE MEDICINE AND HYGIENE, by *Milton J. Rosenau*, *Professor of Preventive Medicine and Hygiene, Harvard Medical School; Professor of Epidemiology, Harvard School of Public Health; Captain, Medical Corps, U. S. Naval Reserve; etc.* Fifth edition. D. Appleton & Co., New York, 1927.

Rosenau's work, since its first appearance, has been the standard reference and textbook upon the subjects of which it treats. All medical men, especially those who have had to decide questions of public health, have found the earlier editions invaluable. This new edition will be even more valuable than its predecessors because much new information has been included, bringing the book strictly up to date.

Among the new features of this edition are considerations of psychoanalysis in its relation to sex hygiene, and periodic physical examinations—with which the author advocates mental examinations. A new section on mental hygiene, by Abraham Myerson, has been added.

This book will, naturally, find a place on the shelves of all naval medical libraries and, it is safe to venture, will be referred to with great frequency and profit.

A TEXTBOOK OF CLINICAL NEUROLOGY, by *Israel S. Wechsler, M. D., Assistant Professor of Clinical Neurology, Columbia University, New York; Attending Neurologist, The Montefiore Hospital, New York.* W. B. Saunders Co., Philadelphia.

A book of 725 pages, including the index, 126 figures and illustrations, and divided into five parts as follows: Method of examination, the spinal cord, the peripheral nerves, the brain, and the neuroses.

The index is adequate and comprehensive. The illustrations of pathological sections are very good. The photographs of patients presenting specified clinical syndromes are the usual exaggerated textbook pictures.

In part 1, method of examination, Doctor Wechsler has realized that no student and few graduates of medicine know anything about clinical neurology, so he has recorded a comprehensive method of taking a neurological history and performing such an examination. The interpretation of the signs and symptoms is a bit didactic but as liberal as could be for the space allowed. The section on psychometric tests could have been omitted because not enough information is given to enable the beginner to perform the tests.

The remaining four chapters are clear and concise, to the point, and written in a most pleasing style. At the end of the discussion in most instances, is given a short differential diagnosis which portrays the outstanding feature of the book—clearness and simplicity of thought, yet scientific and accurate.

SHELL SHOCK AND ITS AFTERMATH, by Norman Fenton, Ph. D., Associate Professor of Psychology, Ohio University, etc., with an introduction by Thomas W. Salmon, M. D., Professor of Psychiatry, Columbia University, etc. The C. V. Mosby Co., St. Louis, 1926.

The author, who was on the staff of Base Hospital 117, American Expeditionary Forces, during the war, has, in this work, brought together the data collected in a most complete and thorough "follow-up" of the war neurotics (shell-shock patients) who were under treatment in this hospital.

Approximately 1,000 war neurotics from Base Hospital 117, American Expeditionary Forces, were studied in each of two "follow-ups"—the first in 1919-20, the second in 1924-25—made possible by the national committee for mental hygiene.

Relatively few of the men studied have shown any evidence of psychosis during the six years which have elapsed since they were returned to civil life. Those with more education are adapting themselves to present conditions better than are those with less. In 1919-20 about 40 per cent of those studied were still unable to play their full part in life. In 1924-25 this number had been reduced to 20 per cent. However, even at that late date, the author states that no real understanding of the nature and control of neurosis had been reached. He sees hope in the activities of the Veterans' Bureau and other social organizations and believes that some progress has been made.

The books contain much new statistical data and should be a valuable guide to those who undertake similar studies in the future.

DISEASES OF THE INTESTINES, by A. P. Cawodias, O. B. E., M. D. (Paris), M. R. C. P. (London), formerly Chief of Medical Clinic, Paris University, Beaujon Hospital; Senior Physician and Lecturer for Clinical Medicine, Evangelismos Hospital, Athens. William Wood and Co., New York, 1927.

From an etymological standpoint this book is unique, for the author is apparently a confirmed verbarian, continually coining new words for old ideas. Who reads the book will need his dictionary close at hand and will find at least a score of words not in any of the ordinary medical dictionaries. This feature is stimulating to the mind, but it does not make easy reading.

A new classification of intestinal diseases is submitted which is worthy of careful consideration as it is evidently based on years of close study of these conditions. It is tremendously intricate but perhaps not too much so for the specialist in this field. Many of the chapters are delightfully clear and practical, especially those on appendicitis, intestinal obstruction, hemorrhoids, duodenal ulcer, and cancer of the intestines.

SURGICAL APPLIED ANATOMY, by Sir Frederic Treves, Bart. Eighth edition, revised by O. C. Choyce, O. M. G., O. B. E., B. Sc. (N. Z.), M. D. (Edin.), F. R. C. S. (Eng.), Professor of Surgery, University of London, etc. Lea and Febiger, Philadelphia, 1927.

More than a quarter of a century ago we studied our anatomy from an earlier edition of this work. In those days it was recommended not only because of its brevity and accuracy but also for its extremely practical surgical suggestions.

Close examination of this new edition shows that, in spite of new editions and new editors, it has lost nothing of its practical value.

X-RAY DIAGNOSIS, by J. Magnus Redding, F. R. C. S., Senior Surgical Radiologist to Guy's Hospital. William Wood & Co., New York, 1927.

The author has attempted in this book to supply enough information by text and plates to enable the practicing physician and surgeon, who is not himself an expert radiologist, to arrive at a correct diagnosis from a study of X-ray plates. The text is comparatively brief and necessarily condensed, but is sufficiently comprehensive to give one a good working knowledge of the subject. The newer methods of X-ray study of the lungs and gall bladder are described. The 80 plates, each made up of several figures, are excellent, and illustrate the normal and departures therefrom in an unusually clear manner.

SIGNIFICANCE OF PHYSICAL CONSTITUTION IN MENTAL DISEASE, by F. I. Wertheimer, Associate in Psychiatry, Henry Phipps Psychiatric Clinic, Johns Hopkins; and Florence E. Hesketh, Charlton Fellow in Medicine, Johns Hopkins University. The Williams & Wilkins Co., Baltimore, 1928.

An interesting but rather technical book which requires for its understanding a working knowledge of the body types described by

E. Kretschmer and of the anthropometric technique devised by R. Martin and A. Hrdlička. From the opening pages one learns that from very early times a study has been made relative to the question of a connection between the mental functions and the external appearance. The number of cases studied was 65; all were psychopathic males, who were "chosen at random without any consideration of diagnosis or physical habitus." Anthropometric findings, the data obtained from observation, and the physical examination of each patient were separately taken and analyzed. The authors have devised a new anthropometric index; four simple measurements are taken and from them the index is determined. The results of the investigation seem to indicate that a definite relation as to body type exists between the new index findings and the findings of simple inspection.

THE CLINICAL INTERPRETATION OF BLOOD CHEMISTRY, by *Robert A. Kilduffe, A. B., A. M., M. D., former Major, M. C., U. S. A., Director, Laboratories, Atlantic City Hospital.* Lea & Febiger, Philadelphia, 1927.

The application of blood chemistry is gaining in importance yearly. The clinical interpretations are of extreme importance. This book covers the subject in a brief and thorough manner.

The chemical analysis and contents of the blood are taken up by chapters, from the collection of the blood to the interpretations of the findings in diseases, especially diabetes mellitus.

This subject is thorough, giving the analysis and interpretation of the blood sugar, glucose tolerance test, calculation of diet, acidosis, and insulin treatment. While there is nothing new in this work, it is an excellent guide and ready reference.

DENTAL MATERIA MEDICA AND THERAPEUTICS, by *Hermann Prinz, A. M., D. D. S., M. D., Sc. D., Professor of Materia Medica and Therapeutics, Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania; Lieutenant Commander (D. C.), U. S. N. R., etc.* Sixth edition. The C. V. Mosby Co., St. Louis, 1926.

This book has been revised to conform to the tenth decennial revision of the United States Pharmacopœia. In addition to the matter usually found in books of its kind, the author reviews the history of dental materia medica and therapeutics and devotes considerable space to physical therapeutics and local anesthesia. Many useful formulas are included, and the appendix will be found valuable for ready reference. The author's wide experience as a teacher commends the book to the student. It should be equally welcome in the practitioner's library.

OUTLINES OF COMMON SKIN DISEASES, by *T. Caspar Gilchrist, M. D.* The Williams & Wilkins Co., Baltimore, 1927.

This small pocket manual on the diagnosis of skin diseases is written in the form of an outline and illustrated by actual photographic prints of the commoner skin diseases.

It is an excellent reference book and one that will be used frequently by the general practitioner.

ELEMENTARY BACTERIOLOGY AND PROTOZOOLOGY FOR THE USE OF NURSES, by *Herbert Fox, M. D., Director of the William Pepper Laboratory of Clinical Medicine in the University of Pennsylvania, etc.* Fourth edition, thoroughly revised. Lea & Febiger, Philadelphia, 1926.

This is an excellent textbook. The printing is good, and the illustrations portray the various subjects very well. The student nurse can gain a thorough understanding of the fundamentals of bacteriology from this work, which will be a valuable addition to the libraries of hospitals where nurses and hospital corpsmen are being trained in laboratory technique.

THE SHIP-SURGEON'S HANDBOOK, by *A. Vavasseur Elder, D. S. C., M. R. C. S. (Eng.), L. R. C. P. (Lond.), Surgeon Lieutenant Commander, R. N. V. R.* Third edition. William Wood & Co., New York, 1927.

Young medical men entering upon their duties as ship surgeons for the first time will find this book of immense value, as it contains about all that need be known to enable a well-qualified graduate in medicine to step from his familiar surroundings on shore to the unfamiliar life on board ship without becoming lost.

The author is a ship surgeon of long service, and what he has to say is founded upon personal experience. Evidently he knows whereof he speaks.

Seasickness is discussed at some length; the theories as to its cause and the best methods of treatment being given.

It is of interest to note that, according to the author, since the advent of prohibition in the United States there has been a noticeable increase in the number of cases of seasickness among Americans returning from England and the Continent.

The chapter on ship etiquette and customs contains many suggestions which would be of value to young medical officers of the Navy as well as to surgeons in the merchant marine.

Any doctor contemplating a voyage as ship surgeon would do well to read this book and put its lessons into practice. He would thereby save himself from many pitfalls.

APPLIED REFRACTION, by *Homer Erastus Smith, M. D., Assistant Surgeon, Manhattan Eye, Ear, and Throat Hospital, New York City; etc.* William Wood & Co., New York, 1927.

This small volume of 126 pages, as stated in the introduction, is not a book for beginners. Nor is it a manual for the conduction of a refraction, as the title intimates, but is rather the description of the refinements of refraction, and a technic that is to the Nth degree perfect. The method of a complete refraction as outlined is far too complicated and time-consuming to be of practical value in the naval service where the refractionist may not devote his entire time to this work.

The chapters which deal with the psychology of the refraction room and the one on the cosmetic value of glasses are very interesting and instructive with many valuable points which are frequently overlooked.

A COMPEND OF MEDICAL CHEMISTRY, by *Henry Leffmann, A. M., M. D., Lecturer on Research, Philadelphia College of Pharmacy and Science, and Max Trumper, B. S., A. M., formerly in charge of the Physiologic Chemistry Laboratory, Jefferson Medical College.* Seventh edition—revised. P. Blakiston's Son & Co., Philadelphia, 1927.

One of Blakiston's series of compends, this little volume fills adequately the place for which it is intended. As an aid to students in preparing for examination and as a means of quick reference for the busy practitioner it is good. This edition, the seventh, has been revised to conform with the newer knowledge of chemistry and is thoroughly up to date.

DELAMAR LECTURES, 1925-26. The Williams & Wilkins Co., Baltimore, 1927.

This volume contains 13 lectures delivered during 1925-26 under the auspices of the School of Hygiene and Public Health of the Johns Hopkins University by various leaders in public-health work. They cover a wide range. The prevention of simple goiter, advances in industrial toxicology, problems of rural hygiene, the treatment of tuberculosis, and the relation between types of body build and health and longevity are some of the topics discussed. All the lectures are of a practical nature and contain the latest information on the subjects with which they deal.

The School of Hygiene and Public Health of Johns Hopkins University is to be commended for publishing these lectures in book form, thereby making them available for many who otherwise would have no opportunity to read them.

THE FIFTH AVENUE HOSPITAL CLINICS, First series. Paul B. Hoeber (Inc.), New York City, 1927.

The papers published in this volume are based upon the clinical material presented and discussed at the semimonthly staff meetings.

They give an idea of the amount and character of the work being done at this one of the great modern hospitals. Necessarily, because of the high standing of the members of the staff who have contributed to the volume, much that is new and valuable is brought out. The book is attractively gotten up and the illustrations are excellent.

SAVING EYESIGHT AFTER MID-LIFE, by *John Herbert Waite, M.D., S.M., Instructor in Ophthalmology, Harvard Medical School.* Harvard University Press, Cambridge, Mass., 1927.

This small book contains one of the Harvard health talks, popular lectures delivered at Harvard Medical School. It is eminently practical, in that it calls attention to the vast damage done by unnecessary blindness after the age of 40 and shows how much of it may be prevented.

It is shown that 55 per cent of blindness is due to causes within the body. Glaucoma causes one-third of all blindness arising after the fortieth year. It is easily curable by simple operative procedures and may be held in check for years by medicinal means. Other causes of blindness are degenerations or new growth in the brain, optic nerve, or eyeball.

Periodic examination by an oculist is advocated as the chief preventive measure against blindness after mid-life.

This is an excellent book to place in the hands of persons who feel that failing eyesight is simply an evidence of advancing years and that nothing can be done to prevent it.

A TEXTBOOK OF EXODONTIA, by *Leo Winter, D. D. S., Professor of Oral Surgery, New York University College of Dentistry; Oral Surgeon, Flower Hospital; Lecturer in Oral Surgery, New York Homeopathic Medical School; Visiting Dental Surgeon, Harlem Hospital, Bellevue and Allied Hospitals, New York City etc.* The C. V. Mosby Co., St. Louis, 1927.

In excellent type, an advanced textbook for the dental student and for the general practitioner who contemplates the practice of exodontia as a speciality. The chapters on anesthesia and anesthetics are clear and concise, and the remaining chapters on oral surgery are comprehensively written. The illustrations are excellent and are of value in aiding the reader to a thorough understanding of the text.

ACTIONS AND USES OF THE SALICYLATES AND CINCOPHEN IN MEDICINE, by *P. J. Hanzlik, M. D., Professor of Pharmacology, Stanford University School of Medicine, San Francisco.* The Williams & Wilkins Co., Baltimore, 1927.

In this rather comprehensive monograph the author sums up the knowledge concerning the salicylates and cincophen since their introduction into medicine. One gathers the impression that our knowledge of these drugs is still very indefinite and somewhat empiric. Part III, dealing with clinical matters, will appeal especially to

internists, while the rest of the monograph will primarily interest pharmacologists and physiologists. Much of the research work has been done by the author, whose conservative and critical interpretation of experiments has added valuable facts to our understanding of the subject.

PRACTICAL NURSING, for male nurses in the R. A. M. C. and other forces, by *Col. E. M. Hassard, A. M. S. (Retd.), and A. R. Hassard*. Second edition. William Wood & Co., New York, 1927.

As the title indicates, the book contains many hints on nursing. The writer goes into considerable detail, and the material is so arranged that the book is handy for reference purposes. This work differs somewhat from the average textbook on nursing in that it includes the nursing of tropical diseases, and it should be of special interest to the members of the Nurse Corps and Hospital Corps of our Navy.

TIGER TRAILS IN SOUTHERN ASIA, by *Richard L. Sutton, M. D., Sc. D., LL. D., F. R. S. (Edin.)*. C. V. Mosby Co., St. Louis, 1926.

This versatile dermatologist has again recorded his annual vacation in a delightful book of big-game hunting similar to his "African Holiday." "It is not often we have a description of the native and animal life of Indo-China; hence this book will be of value not only to sportsmen but to anthropologists. Doctor Sutton's shrewd observations of the customs and habits of the primitive people in Annam, especially the Moi race, are exceedingly interesting.

THIS BUSINESS OF OPERATIONS, by *James Radley*. The Digest Publishing Co., Cincinnati, 1927.

The story of a man who dreaded going to the hospital for operation and was able to fool himself into the belief that it was not necessary, until the inevitable crisis arrived and he was forced to go. What he saw and learned there was enough to convince him that a hospital is not a place to be avoided, surgeons are not ogres, and being a patient in a hospital is a liberal education. Entertainingly written, this little book is a good one for doctors to hand to their patients who still feel that a hospital is full of gloom and a place to be shunned. It will do much to relieve the anxiety of the timid surgical prospect.

INTERNATIONAL CLINICS, edited by *Henry W. Cattell, A. M., M. D.*, Philadelphia. Volume I. Thirty-Seventh Series, 1927. J. B. Lippincott, Co., Philadelphia, 1927.

This volume comes up to the expectations of the reader. Many different subjects are well covered by prominent American and foreign writers. The articles are all of so much value that it is hard to distinguish the leaders. The articles most striking to the reader are:

"Problems of paresis," by Prof. Oswald Bumke, M. D., of Munich, Germany; "Action of quinine and quinidine upon the heart," by H. Van Wily, M. D., Hague, Holland; "Rectoscope especially designed for use in the injection and treatment of hemorrhoids," by J. F. Montague, M. D., F. A. C. S., of New York; "Problems and practice in biliary surgery," by W. Wayne Babcock, M. D., F. A. C. S., Philadelphia; and "The types of anal and rectal cancer," by C. J. Drucek, M. D., of Chicago. "The progress of medicine for 1926," by H. W. Cattell, M. D., Philadelphia, and James F. Coupal, M. D., Washington, D. C., contains a great deal of new data of great importance.

A MANUAL IN PRELIMINARY DIETETICS, by *Maude A. Perry, B. Sc., Director of Dietetics, the Montreal General Hospital, Montreal, Canada.* The C. V. Mosby Co., St. Louis, 1926.

In this little book the author presents the essentials of dietetics in a manner especially suited to the needs of pupil nurses.

It is composed of 15 lessons. The first lesson explains feeding the sick, nutrition, and beverages. There follow lessons on food principles, different kinds of food, food sanitation, methods of cooking, menu making, meal planning, diets for infants and children, food for the aged, charts, tables, and computations. The subject is well covered in an elementary way.

HOSPITAL HOUSEKEEPING AND SANITATION, by *Nora P. Hurst, R. N.* The C. V. Mosby Co., St. Louis, 1926.

Gives a very clear and comprehensive view of the various departments of the modern hospital of to-day and shows how much of the successful functioning is due to the careful and intelligent oversight of the nursing service. A valuable book for the beginner in training school.

THE DIVISION OF PREVENTIVE MEDICINE

Commander J. E. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

DIGEST OF THE VIEWS OF MEDICAL OFFICERS REGARDING VENEREAL DISEASE PROBLEMS AS RECORDED IN VARIOUS ANNUAL SANITARY REPORTS FOR 1926

Venereal diseases were mentioned in nearly all of the 1926 sanitary reports, and problems encountered in carrying out prescribed methods of control were discussed briefly or at length by all but a few medical officers.

The venereal diseases continue to impose a heavy burden of work on the Medical Department of the Navy. The problem of prevention is complex. It is complicated by the necessities arising from essential activities of the Navy which require that its personnel be sent into many places where exposure to infection is avoided only in so far as individuals can be relied upon to avoid sexual intercourse when opportunity offers, as it frequently does, with inducements strong enough to upset any preresolved caution in the cases of many of the men at least. After exposure, chemical prophylaxis lessens the risk of infection somewhat; greatly, broad experience seems to indicate, if an approved method of disinfection is applied promptly and carefully, but it is far from being a simple matter to induce men to avail themselves of prophylactic treatment early enough.

Difficulties also arise to interfere with the effective application of other preventive measures. While it is not difficult to state certain general principles which, if adhered to, might be expected greatly to lessen the incidence of venereal disease in the Navy, it is often difficult under the varying circumstances and hazards encountered by naval organizations to make effective certain preventive measures which intrinsically are of unquestioned value.

Medical officers of the Navy of course realize that while responsibility for preventing men from becoming infected is commonly assumed to rest upon them, in reality they are, from the nature of things both naval and psychological, in a position to do only a small part of what is necessary to lessen the numbers of men infected. There is, to be sure, the obligation to see to it that all men are

aware of the nature and dangers of the venereal diseases, and to endeavor to extend the uses of and make the administration of prophylactic treatment more effective.

Medical Department administration should of course be so conducted as to discover promptly as many as possible of the men who become infected and to insure the best possible treatment for them. Doubtless the work involved in diagnosing and treating the venereal diseases will continue heavy, and the continued evidence that the Medical Department is largely concerned with the venereal disease problem is, perhaps, the main reason why officers of the line appear to assume that it is essentially the medical officer's problem. General Order No. 69, amended, places responsibility upon medical officers respecting the manner in which certain prescribed preventive measures are carried out, but responsibility for making it possible to carry them out in the contemplated manner is placed on commanding officers of fleets, forces, ships, and station. It is interesting to note in reading reports of admirals' inspections of ships that the statement required by paragraph 8 of General Order No. 69, amended, as to the manner in which the department's order is being enforced, is usually made, if made at all, in a section which bears only on the efficiency of the medical department.

In the service at large it has too generally been overlooked in practice that the venereal diseases are the unpleasant and dangerous results of social instincts and social activities over which the medical officer has little control or no control whatever unless perchance his knowledge of a given situation leads to ideas which are accepted and put into effect by the commanding officer. Very often, of course, the latter also is not in a position to influence the behavior of the men very much. Venereal-disease hazards are inextricably entangled with the highly desirable as well as undesirable opportunities for social diversion and much needed recreation. While these diseases are quite properly classed as communicable from the epidemiological viewpoint it does not follow that the medical officer should be expected, as he naturally is when diphtheria, measles, or some other communicable disease threatens, to recommend all measures that may be required under the circumstances to eliminate the disease.

In civil life it has not been possible to place responsibility to an appreciable degree upon practitioners of medicine for preventing exposure to venereal disease. Instead we find that the responsibility falls chiefly on the police department and the courts, and to a limited extent upon the health department. Of course, the clergy are expected to concern themselves with training in ethics and with the activities of social hygiene organizations which are endeavor-

ing, among other things, to educate the public regarding the venereal diseases and social conditions that cause them to spread. Physicians are naturally expected to participate in view of their special knowledge of the diseases as well as of human nature. The medical officer of the Navy is of course a health officer as well as a physician, but the direct authority delegated to him is even more limited than that under which the civilian health officer usually acts.

In the Navy Department the Bureau of Medicine and Surgery must necessarily concern itself with all phases of the venereal disease problem—medical, social, psychological, economic, political, legal and disciplinary—if for no other reason than to understand the complex background from which the diseases emerge and to inform the department as to what is necessary if the damage to the Navy is to be reduced.

Medical officers are expected to study conditions throughout the service and inform the bureau of their observations and opinions. Annual sanitary reports should naturally serve as important sources of information. The information should relate not only to difficult and unsolved problems but there should be no failure to describe and discuss measures which have apparently led to good results.

While the annual sanitary reports for 1926 did not in many cases contain as much useful information as might have been expected, it is believed that a digest of the observations recorded by various medical officers as well as the opinions expressed by them regarding the several phases of the venereal-disease problem chiefly of interest to the Navy, will be both interesting and valuable to others.

Before quoting from reports it should be said that, in general, medical officers of organizations which had high venereal-disease rates, or higher rates than during the previous year, discussed conditions more in detail than those whose organizations had low or decreased admission rates. It is perhaps natural that this should be so. The venereal diseases are not the only ones with which the health officer's interest is proportional to the amount of damage being experienced. It may also be remarked that the greatest rate of progress in the direction of prevention and control is often made when the incidence of a disease is high and the high incidence is recognized. Certain diseases, of course, may be very prevalent in a community and because of incomplete reporting there is little apprehension and little or no preventive action.

Low admission rates from venereal diseases may result from lack of liberty or opportunities for the men to expose themselves, or because for various reasons the conditions in places visited either prevent intercourse with women or comparatively few women with whom the men have relations are infected. The admission rate may

also be low in spite of dangerous contacts if prophylactic treatment is properly administered to nearly all men who have exposed themselves. Finally, the rate may be low if all cases are not discovered and infected men admitted to the sick list for statistical record.

It is interesting to learn from medical officers what they think the reasons were for great incidence of venereal disease under different conditions and in different cities, but even more valuable information relating to prevention and control and the efficacy of such measures as have been tried might be forthcoming if medical officers of organizations experiencing low admission rates would present in their reports the reasons among those included in the above summary that are believed by them to have prevented high rates. Some medical officers frankly admit that the last reason mentioned in the previous paragraph is a not unimportant factor. In former years it was not uncommon to find a medical officer stating that incomplete reporting was the explanation for low admission rates while his predecessor was attached to the organization. This appears not to have happened in 1926, and it may be that reporting is now generally more complete than in previous years. It must be understood by nearly all concerned that the discovery and recording of all cases is quite essential to proper treatment and successful management of the venereal disease problem in its broader aspects. It is of course well understood that an increase, often a great increase, in the admission rate frequently attends increased efforts to put into effect all those measures which should be applied—educational, improved clinical practice, better supervision over prophylactic treatment, and the various and sundry methods for inducing infected men to apply for treatment.

The sanitary reports reflect many viewpoints and various opinions, some of which conflict with others as might be expected.

Capt. J. M. Brister, Medical Corps, United States Navy, fleet surgeon, United States Battle Fleet, noted a wide discrepancy between the venereal-disease admission rate of the U. S. S. *Aroostook*, 134.7 per 1,000, and that of the U. S. S. *Langley*, 55.8 per 1,000. He remarked that both ships are engaged in the same class of work and both have the same home port. The reason for the difference in rates was not apparent to him. He also stated that Seattle and environs continue to supply a large part of the venereal infections and were responsible for the U. S. S. *Nevada's* high rate, 175.5. He observed that there has been a change in the municipal government and an attempt is being made to remedy the situation, the Department of Health cooperating when sources of infection are reported, by locating the accused woman if possible, having her examined, and instituting appropriate treatment if she is found infected.

Other more or less conflicting remarks relating to Seattle will be found below.

Capt. S. S. Rodman, Medical Corps, United States Navy, fleet surgeon, United States Scouting Fleet, discussed the management of venereal diseases in the cases of men attached to vessels without medical officers and also the manner in which General Order No. 69, amended, was being enforced. He found in making inspections that the order had not been received and put into effect by many ships. Subsequently a special letter was circulated directing strict compliance with that order. During the six months, July 1 to December 31, 1926, there were 379 new cases of venereal infection in which prophylactic treatment had not been taken, but trial by summary court-martial followed in only three cases.

In his opinion paragraph 5 of General Order 69 and paragraph 7 of General Order 69, amended, are not conducive to the best results. He considers that orders on this subject should be revised so as not to require an individual who has exposed himself to infection and used prophylaxis (sanitube) as directed by a medical officer to take prophylaxis again upon returning to his ship or station. He believes self-administered prophylaxis with the prophylactic tube as now issued is efficacious in a large percentage of cases, and it has the great advantage of being available for immediate use. He argued that the requirement to supplement its use by additional treatment, hours later, can only result in lack of confidence on the part of the individual.

It may be remarked that the policy he advocates was that defined by General Order 69 before it was amended, which governed from September, 1921, to April, 1926. During that period it became apparent to the commander in chief of the United States Asiatic Fleet and also to the commander of naval forces in Europe that no great proportion of exposed men could be relied upon to take prophylactic treatment themselves. Venereal-disease rates increased enormously. In both forces the commanders found it necessary to exercise their own authority and make supervised prophylaxis mandatory, meanwhile continuing the issue of prophylactic tubes. Reports from many ships and stations, especially those from the special service squadron, also indicated that it was not possible to induce the men generally to use the tubes. In other words, it became apparent that the only way to insure any prophylactic treatment for many men was to require them to submit to supervised prophylactic treatment under penalty for disobedience of orders. Paragraph 7 of General Order 69, amended, simply made uniform for the entire Navy the practice which various commanders had been forced to adopt by appalling increases in the numbers of men infected in ports where hazards were great.

The fleet surgeon of the Scouting Fleet also wrote that a recent compilation showed that there were 19 men in that fleet with venereal disease on board ships having no medical officer. To indicate the action taken he quoted from Scouting Fleet Letter No. 8-26 as follows:

"The commander, Scouting Fleet, is of opinion that this is fair neither to the individuals so affected nor to the service. It is therefore directed that force commanders take immediate steps to make transfers within their commands so that any man suffering with a venereal disease requiring treatment shall be on board a ship to which a medical officer is attached. For the purpose of this order destroyers operating with division medical officers are not considered as ships without a medical officer. In the future where a case of venereal disease develops on board or is received on board a ship without a medical officer the fact will be immediately reported to the force commander, who will effect transfer either to a hospital or to a ship to which a medical officer is attached."

Commander A. B. Clifford, Medical Corps, United States Navy, force medical officer, United States naval forces, Europe, wrote that the venereal diseases continue to be a big problem, but that it was gratifying to see that the record for vessels on that station is better than that of several other divisions of the United States Fleet, although there is probably no place in the world where the two important factors, easy availability of alcoholic liquors and sources of infection, are more in evidence. The number of infections appeared to be greatest in ports where the standards of general sanitation were low, or in those in which there is the least supervision of prostitution or where there are the largest numbers of unlicensed street walkers. To illustrate what he assumes to be the continental attitude toward the venereal-disease problem he cited an incident which occurred on board the U. S. S. *Pittsburgh*. One morning a very distinguished looking gentleman came on board, dressed in morning coat, striped trousers, spats, and silk hat. He was thought to be at least a marquis or some high city official but turned out to be the owner of several houses in the restricted district. He had come aboard to protest because his houses were in the district which was declared out of bounds. His argument was that his houses were clean and sanitary, his girls high class and under the strictest supervision and medical inspection, that there was every facility for cleanliness and prophylaxis, and that if his houses were placed out of bounds the men would go to places where such favorable conditions did not exist, much to their detriment. Under the conditions existing in the locality there was some merit in his contention.

Commander G. S. Hathaway, Medical Corps, United States Navy, squadron medical officer, Special Service Squadron, notes that

venereal afflictions are always a menace to liberty parties in the countries of Central America. The cities of Colon and Panama contribute more than their share of infections, notwithstanding earnest efforts of medical officers to keep admissions at a minimum when in those ports. The ready availability of alcoholic beverages militates against reduction in the incidence of venereal diseases. In making comparisons with venereal-disease admission rates for other flag commands, he thinks it is only fair to consider vessels serving in foreign waters. In this restricted class the figures for the Special Service Squadron seem to him not excessively high. Under existing conditions he believes the endeavors of medical officers attached to ships, in the interests of control, can best be directed toward making early prophylactic treatment readily obtainable and encouraging the use of prophylactic tubes without, however, omitting educational instructions to the crew. In his experience educational efforts have been productive of very discouraging results.

Capt. W. A. Angwin, Medical Corps, United States Navy, fleet medical officer, United States Asiatic Fleet, observed that a tremendous morbidity toll taken by the venereal diseases is evident from perusal of individual ship and station sanitary reports. He states that ships' medical officers have been uniformly zealous in presenting the educational side of the subject by talks and posters. Medical prophylaxis as provided for by regulations is available on all vessels and has been administered consistently. Ship prophylaxis stations are open for treatment during all liberty hours. Prophylactic tubes are distributed to men applying for them. Despite all these measures, the percentage of venereal infections is exceedingly high; so high, in fact, as to constitute a grave doubt as to the efficacy of present methods of handling the problem on the Asiatic Station.

The interpretation of the last remark is left to the imagination of the reader. Later in his report he questions the value of calomel cream as used in the prophylactic tubes issued and makes certain suggestions regarding prophylactic treatment. Here it is possible he means to suggest regulated prostitution. It is doubtless true that in certain ports, especially those visited by vessels of the Asiatic Fleet, fewer men would become infected if their relations were confined to certain prostitutes surrounded with sanitary restrictions.

When the U. S. S. *Huron*, about to return home, gathered her home-going crew aboard, an examination of the men and their records disclosed astounding conditions. Of a total of 770 individuals, all but 278 had contracted venereal disease one or more times during their stay on the Asiatic Station, an individual morbidity rate, during an average exposure period of a little more than two years, of 63.9 per cent.

At Chefoo during the summer, he continues, an opportunity was offered with the whole fleet present to test the value of immediate prophylaxis. In years gone by a prophylactic station was operated in the men's toilet room in the Young Men's Christian Association Building. It was not satisfactory in construction or equipment and was objected to on moral grounds by certain local supporters of the Young Men's Christian Association. So a room 16 feet square was procured without cost through the courtesy of a local merchant in a central part of the town not far from resorts of a questionable character. A doorway was cut through the wall facing the street, and an illuminated sign was hung over the doorway, "First Aid Station for U. S. Sailors." With the establishment of the shore prophylaxis station steps were taken to put out of bounds all known houses of prostitution. This procedure practically closed the Chinese houses and threw the inmates on the streets where some soliciting went on, which, however, grew less and less as time went by. Several Russian houses were closed, and the inmates either left town or joined the entertainment forces of the several Russian cabarets still remaining open. Some of the cabarets were unquestionably resorts for clandestine prostitutes, but were not put out of bounds owing to lack of proof.

The method of prophylaxis outlined for use at the station was as follows: The man entering for treatment reported to the attendant and gave him the data required for his reports. He was instructed to urinate and was then given a piece of lint 2 by 6 inches impregnated with green-soap solution. With the cloth and running water he washed his external genitals and adjacent areas of the abdomen and thighs. He then rinsed off and was given a 6 by 6 inch Turkish towel. After drying the skin he applied the contents of a prophylactic tube and wrapped the waxed paper around the penis. Upon returning to his ship he reported that he had taken prophylactic treatment. In some ships regular prophylactic treatment was administered on board in addition, but that was not compulsory during the continuance of the station ashore. Reports were distributed by the station weekly to the various units of the fleet.

No urethral disinfectant injection was used at the shore-treatment station. That, Captain Angwin states, was because the method of using syringes and solutions as found by practical experience is dirty and in many instances might easily be a source of infection. Furthermore, there were no means for sterilizing syringes at the shore station. But principally, it appears, urethral injections were discarded because of a long-established and firm belief on the part of the fleet surgeon in the efficacy of soap and water when used immediately after exposure. He remarks that he has advocated and laid particular stress on soap and water for many years in his talks

and bulletins, and his belief has recently been strengthened by laboratory experiments published in current medical literature. The results of prophylaxis administered at the station in question were indicated by a table which is presented below. He considered that while the results are not so startling as to be revolutionary, they show a marked difference in the percentage of men infected which is in favor of the method followed at the shore station. The table is as follows:

	July	August	September	Totals
1926				
Total liberties granted.....	24, 531	25, 438	22, 435	72, 404
Total registered exposures.....	2, 025	1, 218	1, 089	4, 332
Total new cases of venereal disease.....	140	90	68	298
Chancroid.....	67	37	40	144
Gonococcus infection, urethra.....	53	37	18	108
Syphilis.....	20	16	10	46
Total prophylaxes taken at station ashore in Chefoo.....	459	392	363	1, 214
Number of failures of prophylaxis taken at station ashore in Chefoo.....	15	12	13	40
Chancroid.....	8	8	6	22
Gonococcus infection, urethra.....	6	4	7	17
Syphilis.....	1			1
1925				
Total liberties granted.....	22, 089	22, 454	25, 222	69, 765
Total registered exposures.....	2, 936	2, 739	2, 362	8, 037
Total new cases of venereal disease.....	174	171	173	518
Chancroid.....	86	79	114	279
Gonococcus infection, urethra.....	73	79	50	202
Syphilis.....	15	13	9	37

The reader may note that the percentage of men infected notwithstanding prophylactic treatment in the corresponding three months of 1925 was 6.44 per cent. In 1926, with a total of 4,332 recorded prophylactic treatments, which presumably included those administered in the shore station as well as those cases in which the treatment was repeated on board ship, the percentage of infections was 6.88. To what extent exposure and infection hazards may have differed in the specified months of the two years is not discussed in the report. The percentage of infections reported as occurring after prophylactic treatment given in the shore station was 3.29.

The report did not state what steps were taken to make sure that all infections occurring in spite of prophylaxis in the shore station would be recorded. Attention is arrested by the fact that the percentage of infections following all recorded prophylactic treatments, 4,332, in 1926 was higher than the corresponding percentage in 1925, and the 4,332 apparently included the treatments administered at the shore station. It may be observed that the shore station series is rather too small to justify direct comparison with either of the large series. It may also be remarked that the 40 failures charged to the

shore station may not in reality be so chargeable. It is very difficult to make certain that disease developing after a stated prophylactic treatment was not acquired either a day or two before the recorded exposure or, on the other hand, some time after the treatment taken at the shore station.

As the figures stand, prophylaxis at the shore station seems to have been remarkably effective in preventing syphilis. As one might expect, this points to the increased effectiveness of early prophylaxis, but the figures do not make it clear that any credit should be given to a difference in kind of treatment administered; certainly not to the omission of an intraurethral injection of a disinfectant solution. The experience of other medical officers, or rather expressions of opinion, as recorded in sanitary reports of former years, by a number of observers, have been that tube prophylaxis was generally less effective against gonorrhea than against syphilis and chancroidal infections when compared with prophylactic treatment as ordinarily given aboard ship with the intraurethral injection of protargol or silvol solution included. The report in this instance does not definitely state whether a portion of the contents of the tube was injected into the urethra as the instructions which go with the tubes direct, but presumably this form of intraurethral disinfection was followed. There can be no question as to the value of soap and water, per se, applied early or late.

So far as gonorrhea is concerned, it will be noted that the percentage of gonorrheal infections developing notwithstanding prophylaxis in 1925 was 2.51 per cent; in 1926, 2.49 per cent; and in the shore station series, 1.40 per cent. The ratio between syphilis and gonorrhea is of interest. In the 1925 series the ratio was 1 to 5.5. The ratio for all cases in the Asiatic Fleet, with and without prophylaxis, for the three years, 1923-1925, was 1 to 4. In the total 1926 prophylaxis series the ratio was 1 to 2.4 and in the shore station series, 1 to 17. The difference in ratios between 1 to 5.5 and 1 to 2.4 is rather remarkable.

Let us consider syphilis for the moment. Syphilis developed after 0.46 per cent of all prophylactic treatments in 1925, after 1.06 per cent in 1926, and after 0.08 per cent in the shore station series. One factor to be considered is that too little time may have elapsed after the shore station was closed to bring out all the cases of syphilis which subsequently developed. Very likely with the Kahn test available diagnosis of syphilis was in general more prompt in 1926 than in earlier years and that may have been one of the reasons for the narrower ratio in the last year with the total series. A number of other factors may have been involved.

With regard to chancroidal infections in 1925, 3.47 per cent of recorded prophylactic treatments were followed by chancroid; in 1926, 3.32 per cent; and in the shore station series, 1.81 per cent.

The figures therefore seem to indicate greater preventive value for the shore station against all three diseases. As compared with the total prophylaxis series in 1926 the figures indicate for the shore station treatments 43.76 fewer cases of gonorrhea, 45.48 per cent fewer cases of chancroid, and 92.45 per cent fewer cases of syphilis.

Thanks to the efforts of the fleet surgeon of the Asiatic Fleet, we have for study the results of an experiment conducted on a fairly extensive scale. While the volume of data is too small and reliable standards for making comparisons are not available to justify definite conclusions, the indications are that early prophylaxis is greatly superior to delayed prophylaxis, no matter how carefully supervised, against all three venereal diseases, and especially against syphilis. The importance of making such studies when opportunity permits is apparent. It should be observed that prophylactic treatment taken at the shore station was not necessarily early prophylaxis in all cases, even though the station was near questionable resorts. Under purely experimental conditions, with this factor controlled, the results might be much better than those recorded. We are unable to follow the fleet surgeon in his argument that anything is gained by omitting the usual intraurethral injection. This contention has no bearing on the prevention of syphilis and chancroid, and with respect to the prevention of gonorrhea it would seem to be a question of the value of injecting the compound calomel ointment into the urethra instead of a silver salt solution. To him, it would seem, the tubes can be dispensed with altogether in prophylaxis and soap and water relied upon if used early, immediately if possible, to prevent all three diseases. The question of immediate or early prophylaxis versus delayed prophylaxis should be kept separate from the kind of prophylaxis to be used. Logically, soap and water should be used in any case, but it would appear illogical to dispense with calomel ointment, which from experimental evidence appears to be a valuable agent for the destruction of *treponemata*. There is also good experimental evidence that the compound ointment employed in the prophylactic tubes has strong bactericidal action against gonococci in the urethra. Time is the great factor, but, early or late, no one of the promising prophylactic procedures should be omitted. No harm may result from a general understanding that soap and water may prevent infection when other agents are not available, but it hardly seems wise to ignore such agents when they are available.

Captain Angwin referred to a paper read in 1925 before the Malayan branch of the British Medical Association by Lieut. Col. P. H. Falkner, R. A. M. C., senior medical officer, Malaya, on duty at Singapore, who was quoted as follows: "A preventive outfit has

been evolved and issued free to all troops in the Malaya command. It consists of a cover with simple printed instructions, one-half-ounce bottle of spirit soap solution (sapo mollis, 1 part; spirits vini meth., 1 part; water, 2 parts), a strip of white lint 3 inches by 6 inches, and 1 tube of calomel cream. In my opinion calomel cream as used in preventive outfits is most unreliable. I suggest that the basis should be soft soap, and that it should be issued in celluloid tubes."

Captain Angwin is convinced that results are achieved directly in proportion to the time elapsed between exposure and treatment. He continues, "Early, I might say immediate, attention to hygienic toilet following intercourse is the *sine qua non* of success, and our present system of medical prophylaxis with treatment delayed until arrival on board ship fails in this very essential. May it not be reasonable to assume that the reliance placed by exposed individuals on our system of delayed prophylaxis leads them to neglect an earlier and possibly just as efficient a method of prevention—simple cleanliness? If the system is at fault, if delayed prophylaxis as given aboard ship is unreliable and leads, perhaps, to a false sense of security, should it not be discarded and the men exposed given to understand and be taught that reliance can not be placed in medical or hygienic measures at all when they are not taken early? Courses in sex hygiene and personal cleanliness of a practical rather than didactic nature should be taught. It is true that there are better measures of prevention than those in general use in the Navy. The surest and only real preventive is absolute continence. Perhaps next to that is the use of some protector, as a condom. Medical prophylaxis, taken immediately, is third. Where delayed medical prophylactic measures should be placed in the scale is hard to say. Immediate prophylaxis under the supervision of the medical department, in shore stations near the place of exposure, is hardly practicable under the conditions of service on the Asiatic Station. The units of the fleet are too mobile. Where the Navy is stationary, such stations might, with good effect, be established, but, except at considerable expenditure of money and the use of a number of extra men, such stations are not feasible in cities like Shanghai, where vice is not segregated. In Tsingtao, a smaller city, the plan is moderately feasible, and in Chefoo, because of its small area, it was entirely adaptable. Is immediate prophylaxis by the exposed individual practicable? I believe it is; at least it is as likely of success as the present method of delayed prophylaxis. In addition, it lays emphasis on the individual's own attention to sex hygiene, and is in consonance with the later teachings of social hygienists who are leaning away from the earlier compulsory method of sanitation, speaking broadly, and toward the education of the individual to be

voluntarily responsible for his own health. I do believe it is time to put emphasis on some other method of medical prophylaxis and am inclined toward the abolishment of the present system and the substitution of the use of soap and water and the thorough instruction of the personnel in 'how to wash.' The prophylactic tubes can be dispensed with and without loss. As used in the average case, the penis, uncleaned and covered with secretion, is coated with an oily mixture and wrapped in a waterproof cover. No better incubator could have been devised. The substitution issue of condoms is a much more practical preventive measure."

It has been clearly demonstrated that large numbers of enlisted men of the Navy for various and sundry reasons, depending upon time and place of exposure and attending circumstances, can not be trusted to practice any form of prophylaxis. It would seem that soap and water and chemical agents had better be applied late than not at all. Of course every effort should be made to induce men to take precautions against infection at once, but it does not seem altogether reasonable to assume that a man intelligent enough to attempt to secure disinfection can not be made to appreciate the fact that thorough washing with soap and water is an important part of the treatment. Much might be written regarding the use of condoms. So far as we have been able to determine there has been no great demand for condoms. Generally, the men will not use them. The principal reason they are worn, when worn, is because their use is demanded by a woman who fears conception. Their regular use by the men when not so demanded, according to available evidence, is not to be depended upon as a generally effective preventive measure. Condoms are obtainable and many of the men probably know what they are and where to get them in American cities. If there were any great tendency to use them when available, one would expect to learn of it through the various sources of information which include direct contact by the division of preventive medicine with viewpoints of enlisted men as well as official reports.

Lieut. Commander J. W. Vann, Medical Corps, United States Navy, medical officer of the U. S. S. *Huron*, flagship of the Asiatic Fleet until late in the year, noted that the venereal disease admission rate showed a marked increase when the ship first arrived in China after staying in Manila. He remarked that Shanghai was the worst port visited. Conditions were under better control in Chefoo.

Lieut. Commander H. E. Jenkins, Medical Corps, United States Navy, medical officer of the U. S. S. *Beaver*, tender, Submarine Division 16, wrote that the division spent the greater part of the year, 8 months, in China, of which 130 days were spent in the port

of Tsingtao. The personnel were thoroughly instructed with regard to the dangers of venereal diseases, immediate use of prophylaxis, matters pertaining to sex hygiene, and especially the immediate use of soap and water after coitus. He remarked during the stay in Chefoo there was a decline in venereal-disease admissions, no doubt due to the establishment of a first-aid station ashore and restriction from the Chinese section. Prophylactic tubes were provided for men going on liberty and compulsory prophylaxis aboard ship was required, disciplinary measures being taken upon detection of the concealment of venereal disease. Nevertheless, the admission rate still remained high. It was noted that a large percentage of the men infected had been drinking at the time of exposure, and no doubt prophylaxis was improperly used.

Lieut. S. H. White, Medical Corps, United States Navy, medical officer of the U. S. S. *Pillsbury*, wrote that although a vigorous campaign against houses of prostitution in Chefoo was enforced by the shore patrol of the United States naval forces and that a prophylaxis station was maintained in the city, these measures seemed to have no effect on the venereal-disease rate. Double prophylaxis was required for the crew of the *Pillsbury*.

Lieut. W. G. Kilbury, Medical Corps, United States Navy, medical officer of the U. S. S. *Pecos*, wrote that despite talks periodically given to the crew in small groups, and the rigid prophylactic measures instituted, there was no decrease in the number of venereal infections for the year as a whole. He remarked that prophylaxis stations ashore proved very beneficial, and while in ports where there were such stations, notably Chefoo, the percentage of cases of venereal diseases dropped almost to a minimum. Most of the cases of syphilis, 21 in all, were contracted in Shanghai while the ship was on duty with the marine expeditionary force for a period of three months.

Lieut. D. P. Platt, Medical Corps, United States Navy, medical officer of Destroyer Division 45, observed that lack of decent places of amusement ashore in most Chinese ports appears to be the cause of men frequenting dangerous resorts with consequent big venereal-disease rate. He believes the prophylaxis station established ashore in Chefoo by the fleet surgeon during the summer of 1926 was a great help in reducing the venereal-disease rate.

Pharmacist's Mate, First Class, C. A. Craddock, Hospital Corps, United States Navy, attached to the U. S. S. *Hart*, remarked that on board vessels of the Asiatic Fleet venereal diseases as usual led the list of admissions to the sick list. Increase in the venereal-disease admission rate over that of the previous year was attributed to the fact that the vessel spent more time than usual in Chinese waters.

He observed that in ports where all-night liberty is granted the venereal-disease rate promptly rises. All men had been instructed in the proper use of the prophylactic tube. He believes that many who exposed themselves were under the influence of liquor and failed to take prophylaxis properly. Upon returning on board all who had exposed themselves were required to take the standard prophylactic treatment.

Lieut. Commander J. E. Miller, Medical Corps, United States Navy, medical officer of the U. S. S. *Helena*, South China patrol, is of the opinion that frequent lectures and instructions have done some good, but that instructions bear fruit only with enlisted men who are willing and intelligent enough to carry them out. Many factors, active and destructive to character, operate as antidotes against venereal prophylaxis, lectures, and instructions. Among these he sees alcoholism, free and easy access to cheap prostitution, inability of the personnel to grasp the importance of early prophylaxis, granting of overnight liberty, and liberty of 48 hours' duration. The foregoing, he thinks, all act to make prophylaxis ineffective and rob the method of much of its positive worth.

We are again informed by the annual sanitary report of the U. S. S. *Monocacy* that conditions as encountered ashore in China were deplorable—dark, narrow, and filthy streets; no attempts at cleanliness; and no laws regarding hygiene and sanitation. Diseased people, pigs, cats, dogs, and chickens were reported as living indiscriminately crowded together in river towns. Opium dens and houses of prostitution were thought to be numerous in all towns visited. Medical prophylaxis was rigidly carried out. Under existing conditions and with lack of sufficient recreation it was remarkable, according to the report, that the venereal-disease rate was so low. Twenty-four per cent of the crew were infected during the year. Only one man, or 2 per cent of the crew, was known to have contracted syphilis.

The venereal-disease admission rate for the Second Battalion, Fifth Regiment of Marines, stationed at Guantanamo Bay, Cuba, was 103 per 1,000 in 1926. Only two men are known to have contracted syphilis during the year. It is not possible to judge what the danger of infection is in Caimanera and Boqueron as compared with Chinese ports, but Lieut. M. Silverman, Medical Corps, United States Navy, the battalion medical officer, thought the admission rate was low considering the types of prostitutes found in Caimanera. He reported that 1,722 prophylactic treatments were recorded during the year with 37, or 2.2 per cent, infections notwithstanding supervised prophylaxis. The average time elapsing after exposure was not estimated. A prophylaxis station was established on board the shore patrol barge at Caimanera, so there was every opportunity for early

prophylaxis. According to the medical officer, prophylactic tubes were issued to all men going on liberty and in the battalion, upon their return from liberty, men who admitted exposure were given routine prophylactic treatment. Effective cooperation by the commanding officer was mentioned. Lectures were given periodically to the entire command by the medical officer.

Commander C. W. Smith, Medical Corps, United States Navy, senior medical officer of the United States Naval Station, Guantanamo Bay, Cuba, wrote that venereal disease was a serious problem at the station during the year, as it has been in the past and as it will continue to be everywhere that young men have opportunity to associate with women who are promiscuous in their sex relations. He remarked that the opportunity to obtain alcoholic liquors *ad libitum* undoubtedly tends to warp judgment and remove barriers of natural restraint so that increased exposure to venereal infection results. Men are issued prophylactic tubes on request and there is the station at Caimanera on board the shore patrol barge where supervised prophylaxis may be made a matter of record. Records of exposure and prophylactic treatment are also made at the marine barracks and the radio remote station. All records are forwarded weekly to the dispensary at the naval station. The commandant of the station has conferred with the mayor of Caimanera regarding deportation of prostitutes known to have infected naval or Marine Corps personnel. In practice it has been found very difficult to secure the necessary proof of infection. The woman's name and place of residence can seldom be obtained. The medical officer feels that the main reliance in the prevention of venereal disease at that station should be placed on prompt prophylaxis and increased opportunity for healthful recreation. The venereal-disease admission rate for the year was 186 per 1,000. There were 10 cases of syphilis, making the rate 27 per 1,000.

Lieut. Commander H. V. Hughens, Medical Corps, United States Navy, medical officer of the U. S. S. *Raleigh*, reiterates some of the well understood difficulties of securing early, properly administered, and accurately recorded prophylaxis. In his opinion venereal prophylaxis is effective in direct proportion to the intelligence of the person using it. He believes the prophylactic tube used early and properly after exposure is just about 100 per cent effective, and the usual ship's prophylaxis of protargol or silvol solution with inunction of calomel ointment is no doubt efficacious to the same extent as the tube. He considers the statistics which we collect and report monthly on our Form A are not worth the paper upon which they are written. Presumably he referred to the figures relating to prophylaxis; the case figures should be as reliable as those derived from

Form F cards. Admittedly, the reporting of venereal diseases is not complete. The medical officer of the *Raleigh* continues, "The occurrence of venereal disease in relation to prophylaxis taken at various intervals after exposure is, in my opinion, indeterminate in the Navy. Men will often not give the correct time of exposure, will contract the disease, conceal it, and later take a prophylactic treatment for record, occasionally for protection against disciplinary action should it become necessary to come under treatment for a venereal disease."

Lieut. A. B. Chesser, Medical Corps, United States Navy, medical officer of the U. S. S. *Niagara*, presented figures covering prophylactic treatments administered on board that ship, which entered only Central and South American ports during the entire year. The venereal-disease admission rate, 191 per 1,000, was lower than that of the previous year, 247 per 1,000. The admission rate for gonorrhea was much higher in 1926. Three cases of syphilis were discovered. During the year, 2,000 prophylactic tubes were issued to members of the crew who were properly instructed regarding the dangers of exposing themselves to infection. Emphasis was laid on the necessity for immediate prophylaxis and also prophylaxis under the supervision of a Hospital Corps man upon returning to the ship. The number of recorded prophylactic treatments was 529 and notwithstanding there were 22 cases of gonorrhea, 9 of chancroid infection, and 3 of syphilis, making a total of 34 cases of venereal disease, or 6.4 per cent of the men recorded as having taken the treatment. Of the 529 treatments, 184 were recorded as taken within one hour after exposure, 153 in the second hour, 70 in the third, 39 in the fourth, 41 in the fifth, 19 in the sixth, 15 between the sixth and twelfth, and 8 after the twelfth hour. The percentages of failure, so to speak, were 2.2 per cent for the first hour, 9.8 for the second hour, 11.4 for the third hour, 7.7 for the fourth hour, 4.9 for the fifth hour, 5.3 for the sixth hour, 6.7 for the interval between the sixth and twelfth hours. No infection followed in the cases of the 8 men who gave the elapsed time as more than 12 hours. Some of the men who developed infection probably availed themselves of tube prophylaxis, but no information concerning them was furnished. No case of venereal disease developed in the person of a man who was not recorded as having taken supervised prophylactic treatment. This does not mean, of course, that infection actually occurred in the 34 cases notwithstanding prophylactic treatment properly taken after the various exposures really responsible for infection. The figures only illustrate the difficulty of securing accurate information if the statements of the men are relied upon.

Lieut. Commander C. D. Allen, Medical Corps, United States Navy, medical officer of the U. S. S. *Vestal*, undertook to make an accurate check on the number of men who exposed themselves while the ship was at Panama. A pharmacist's mate was stationed at the gangway, and prophylactic tubes were issued to all men going on liberty. When they returned to the ship they were required to report whether they had been exposed; and if so, prophylactic treatment was administered. A few more than 2,000 exposures were reported and there was only one case of venereal disease. Even that case was of doubtful origin. The medical officer thought it probably resulted from exposure in the United States. During the entire year there were 55 cases of gonorrhea, 7 of chancroid, and 10 of syphilis, a total of 72 cases of venereal disease, making the admission rate 144.8, which was a little less than for the preceding year. The majority of cases occurred after liberty and leave granted while the ship was at Norfolk, Va. There the men were granted 48-hour liberty and they were therefore tardy in taking prophylactic treatment. Many of the cases developed in men who had been on leave. Liberty in foreign ports appeared not to increase the number of infections. In most instances overnight liberty was not granted. In his opinion compulsory prophylaxis is a success, but he believes a more thorough campaign along educational lines regarding the benefits of proper prophylaxis would help reduce the numbers of infections in domestic ports.

Lieut. Commander H. W. B. Turner, Medical Corps, United States Navy, medical officer of the U. S. S. *Whitney*, destroyer tender, Squadron 9, remarked that the usual method of protection against venereal infection was prophylactic tubes rather than use of the venereal head. The figures for the year do not support a belief that the men can be trusted both to take the treatment and to use the tubes properly without supervision. The venereal-disease admission rate was 157 per 1,000 in 1926 as compared with 89 per 1,000 in 1925. The report indicates that conditions were similar in both years with respect to general character of the crew from the standpoint of age and occupation, cruising ground, and amount of liberty. The medical officer considers that the crew was well instructed and apparently had full realization of the dangers involved. No comment was made regarding the completeness of reporting in either year.

Lieut. J. F. Luten, Medical Corps, United States Navy, medical officer of the U. S. S. *Elcano*, Yangtze patrol, stated that the system of double prophylaxis was followed. Prophylactic tubes are at the disposal of liberty parties before leaving the vessel. They are also obtainable at the enlisted men's club ashore at Ichang. He considers

that practically all of the infections were due to improper use of the tubes or failure to use a tube at all because of overindulgence in alcoholic beverages.

Lieut. W. H. Funk, Medical Corps, United States Navy, medical officer of the U. S. S. *Scorpion*, reported that a rigorous system of prophylaxis had recently been instituted. Prophylactic tubes are available to all men going on liberty, and they are strongly urged to use a tube immediately after exposure. Upon returning to the ship, all unmarried men are required to answer "yes" or "no" as regards venereal exposure. All answering "yes" must go immediately to the crew's head where a small prophylaxis locker is maintained. At sick call the next morning prophylaxis is repeated under the supervision of the medical officer or the chief pharmacist's mate. The venereal-disease admission rate for the entire year was 282 per 1,000. There were 10 cases of syphilis.

The statistics for some organizations indicated marked decreases in venereal-disease admission rates as compared with previous years. Unfortunately the tendency of medical officers reporting such decreases has been merely to refer to the figures, without discussion which might furnish useful information relative to conditions and circumstances leading to reduced incidence of disease.

Lieut. Commander J. A. Bass, Medical Corps, United States Navy, medical officer of the U. S. S. *Oklahoma*, noted a reduction in the venereal-disease admission rate from 104 per 1,000 in 1925 to 86 per 1,000 in 1926. He also observed that the proportions for syphilis and chancroid infections were slightly increased, while the admission rate for gonorrhea was considerably less. It is possible for this statistical picture to result from other causes, but a narrower ratio between syphilis and gonorrhea with increased rates for syphilis and chancroid infections is suggestive of increased concealment of gonorrhea. One would like to know whether there were conditions which would tend to make the reporting of gonorrhea less complete and also what the conditions were with respect to the diagnosis of syphilis and chancroid infections. It is much easier to detect a high percentage of chancroidal lesions than of gonorrhea cases. In 1925 the ratio between syphilis and gonorrhea was 1 to 5.4, a ratio which is no broader than is to be expected for forces afloat. In 1926 the ratio was 1 to 2.3.

Lieut. Commander John Buckley, Medical Corps, United States Navy, medical officer of the U. S. S. *Omaha*, reported a marked decrease in the venereal-disease rate as compared with that of the previous year. In 1925 the admission rate was 123 per 1,000 and in 1926, 56 per 1,000. The ratio between syphilis and gonorrhea in 1925 was 1 to 9 and in 1926 1 to 9.5. It also appears that the admis-

sion rate from all causes was much less in 1926 than during the previous year. In view of these considerations it is possible that the lessened incidence of venereal disease was due to differences in the make-up of the crew and less exposure, but it is not possible to draw any definite conclusions without knowledge of the conditions and circumstances which may have been involved. The medical officer closed his brief comment with the statement that, considering the low rate of admissions, there were no grounds for complaint.

Commander G. L. Wickes, Medical Corps, United States Navy, medical officer of the U. S. S. *Texas*, remarked that there was a high percentage of occurrence of venereal diseases during the time the ship was in Norfolk, Va. He stated that when he reported for duty it was found that little or no treatment had been given to the syphilitic cases by the preceding medical officer. Most of the patients were found to have strongly positive blood Wassermann tests. With the measures now in effect he believes syphilis is diagnosed early in a majority of the cases in which that disease is acquired by members of the crew.

Lieut. Commander J. E. Potter, Medical Corps, United States Navy, medical officer of the U. S. S. *Black Hawk*, flagship of destroyer squadron, United States Asiatic Fleet, reported that he had made a great effort to introduce a systematic method of treatment for gonorrhea and chancroidal infections throughout the squadron. While the statistics show a material increase in the numbers of admissions, yet there were actually fewer days of restriction in 1926 than in 1925. While we are prepared to believe his efforts were attended with good results, it would have been helpful if he had mentioned the numbers of sick days recorded in each of the years.

Conditions encountered on the European station are discussed in some detail by Lieut. Commander R. M. Waterhouse, Medical Corps, United States Navy, medical officer of the U. S. S. *Memphis*. He states that since he joined the ship there have been material increases in the numbers of admissions for venereal diseases, but he did not consider the admission rate unduly high. The rate for the year was 213 per 1,000. Previous to arrival of the ship on the European station in the latter part of June, the median monthly admission rate (annual basis) was a little less than 80 per 1,000. In July the rate was 270, in August 415, in September 637, in October 272, in November 183, and in December 113 per 1,000 per annum. He observed that in all the countries visited except England, Norway, Denmark, and Sweden prostitution seemed to be a recognized and well-established institution. In the four countries mentioned, however, there were numerous street walkers, and these were especially dangerous, because they plied their trade on the streets and in alleys

and parks, and men thus exposed considered they had no chance to take any kind of prophylactic treatment until they returned to the ship, many hours after exposure, when the treatment was consequently of much less value. In one port the ship was moored alongside a dock for a period of two weeks. There was a large park between the city and the dock, and the park was infested by prostitutes at all hours of the day and night. Twenty-one cases of venereal disease resulted from that visit. The majority of the men who contracted venereal disease were serving in their first enlistment. All members of the crew were frequently warned as to the dangers of exposure and were instructed regarding the proper method of prophylaxis. Supervised prophylaxis was administered in the venereal disease treatment room, where a Hospital Corps man remained on watch until one hour after the last liberty boat returned to the ship. After that the attendant slept on a cot just inside the sick bay door, where he could be called by anyone desiring treatment who returned from liberty at a later hour. Prophylactic tubes were placed at the gangway so that all who desired them could obtain them before leaving the ship.

Lieut. Commander J. H. Robbins, Medical Corps, United States Navy, medical officer of the United States naval station, Olongapo, P. I., reported that the venereal disease admission rate was exceptionally low in 1926. Only three cases were recorded during the year and all three were cases of gonorrhea contracted in Manila by men on liberty or leave. The control over prostitution in the vicinity of the station, including compulsory treatment of infected women and deportation of persistent offenders, required by naval reservation regulation, combined with adequate facilities for recreation, consisting of baseball, tennis, golf, swimming, and hunting, in his opinion, made possible a very satisfactory solution of the venereal-disease problem.

Lieut. D. P. Platt, Medical Corps, United States Navy, medical officer of Destroyer Division 45, United States Asiatic Fleet, recommended after observing increased incidence of venereal diseases while in the Port of Manila, P. I., that influence be brought to bear to eliminate the large and increasing numbers of houses of prostitution in adjacent suburbs of Manila which are readily accessible to enlisted men on liberty.

Commander R. E. Hoyt, Medical Corps, United States Navy, in command of the United States naval hospital, Canacao, P. I., wrote that by far the largest number of admissions to hospital were due to venereal diseases, although the total admissions and total sick days from venereal infections were less than during the preceding year. In 1925 there were 55 admissions and 942 sick days but in 1926 there were only 41 admissions and 863 sick days. The reduction

in cases was attributed by him as due in some measure to the action of the provincial and municipal authorities in closing some of the near-by houses of prostitution and deporting the occupants. Women reported by local physicians as infected were hospitalized. More rigid supervision was exercised over native dance halls. The men were required to take prophylactic treatment as in the past.

Lieut. Commander W. M. Anderson, Medical Corps, United States Navy, reporting for the United States submarine base, Pearl Harbor, Hawaii, stated that special efforts had been made to reduce the incidence of venereal disease by giving frequent short talks to small groups of men. He remarked that there was a slight decrease in the number of cases reported during the year as a whole and a noticeable decrease within the last three months. From data kept at the station, women of Portuguese and Hawaiian descent were found to be the chief offenders. To him it appeared that no effort is being made by the Territorial board of health to locate prostitutes and treat them so they will not be a menace to health. Syphilis appears to have been relatively prevalent, 42 cases having been recognized in proportion to 87 cases of gonorrhea. He considered that laboratory technique could not have been entirely responsible for the high percentage of positive findings in dark ground examinations of suspected primary syphilitic lesions.

Capt. C. G. Smith, Medical Corps, United States Navy, reporting for the United States submarine base, Coco Solo, Panama Canal Zone, stated that while the admission rate on that station was lower than last year it is not to be hoped that the incidence of venereal disease will be markedly reduced so long as uncontrolled prostitution exists in Colon and Panama and the men have free access to alcoholic liquors. Prophylactic stations are operated by the Medical Department of the United States Army both in Cristobal and Balboa. Naval personnel have access to them and the Navy contributes its share of support in the way of supplies. Prophylactic tubes are freely issued to the men and adequate warnings are given concerning the prevalence and dangers of venereal disease, but it seems to be the same old story here as elsewhere; men become intoxicated, have sexual intercourse with an infected prostitute, and awake too late from their alcoholic stupor or indifference to use prophylaxis efficaciously.

The medical officer of the U. S. S. *Cleveland*, Lieut. Commander H. L. Weer, Medical Corps, United States Navy, commented upon conditions in Panama. The *Cleveland* spent the greater part of the year in Panama and Nicaragua. He remarked that venereal diseases caused most of the admissions to the sick list as is usual with ships of the special service squadron. In 1926 there were more admissions

for chancroid infections than for gonorrhea but the reasons for this unusual relationship were not apparent. He stated that most of the cases of venereal disease occurring among the crew of the *Cleveland* were contracted in Panama City where there is practically no control of prostitution. "Placing the 'district' out of bounds only means its removal to another part of the city." He continues, "As usual liquor is the big factor, with all night liberty as a close second. Double prophylaxis is practiced but owing to the shortage of Hospital Corps men supervision is not practical after 12 m. This is a serious drawback, as a man under the influence of liquor will probably be careless in taking prophylaxis."

The brigade surgeon, First Brigade, United States Marine Corps, Lieut. Commander P. E. Garrison, Medical Corps, United States Navy, stationed in Port au Prince, Haiti, wrote that venereal diseases continue to be responsible for the majority of admissions and readmissions to the sick list. Mixed infections are commonly seen, the majority being chancroid and syphilis. The men are given lectures at frequent intervals but the value of these talks is uncertain. Alcoholic drinks of all varieties are available at moderate prices and fees charged by prostitutes are low, varying from 15 cents to \$1. Fees also follow the law of supply and demand, prices being cheaper several days before pay day. Canteen supplies are accepted in lieu of cash, and it is said that some prostitutes run charge accounts with regular customers. Prophylactic tubes are issued to all men going on liberty and prophylactic stations are maintained at all camps, but faulty technique, alcoholic indulgence, and carelessness tend to reduce the efficiency of these measures.

Only two medical officers spoke favorably of General Order No. 69—Amended, by direct reference to it; but after reading all of the annual sanitary reports it seems reasonable to conclude that very few are disposed to criticize any of the provisions of the order. Only one medical officer mentioned that the act of May 17, 1926, had had a beneficial effect, but doubtless most medical officers consider that it has.

Lieut. Commander L. J. Roberts, Medical Corps, United States Navy, medical officer of the U. S. S. *Gold Star*, stated that upon receipt of General Order No. 69—Amended, in September, a system of compulsory prophylaxis was put into effect. During the last three months of the year, with the system in effect, there was a marked falling off in venereal disease and a tremendous increase in prophylaxis taken aboard ship. He believes that during the coming year the compulsory prophylaxis will make a great decrease in the venereal disease rate.

Lieut. Commander A. B. Hayward, Medical Corps, United States Navy, medical officer of the U. S. S. *Pennsylvania*, wrote that Gen-

eral Order No. 69, as amended, is apparently of value in reducing the venereal disease rate, as the number of new cases has been perceptibly less since the order has been put into effect.

Chief Pharmacist's Mate F. C. Farren, Hospital Corps, United States Navy, reporting for the U. S. S. *Somers*, Destroyer Squadrons, Battle Fleet, gives, as Hospital Corps men often do, a closer insight into the attitudes of enlisted men than is usually to be found in reports written by medical officers. He wrote that the venereal disease rate of that vessel was but one-third as high as during the previous year. With full cooperation of the executive officer and commanding officer, the chief pharmacist's mate has taken personal interest in every member of the crew. Prophylactic treatment has been strict and thorough. Prophylactic tubes were cheerfully given with instructions to use them. The name of each man to whom a tube was given was taken, and later it was ascertained whether the man exposed himself. If so, he was given treatment on board ship. Treatments and records were kept confidential. He noted that more men took advantage of prophylaxis after he adopted that policy. Men who had confidence cooperated with him, and he believes kindness, education, and consideration are important factors to which the men respond with obedience. An order signed by the executive officer, displayed on the crew's bulletin board, warns the men that punishment for disobedience of a ship's order will follow in case venereal disease develops and the record does not show that the man took prophylactic treatment. He believes the order increases prophylaxis and decreases venereal disease. The crew was inspected at various times, but no concealment of disease was detected. In no case where venereal disease was contracted during the year did the record show that the man had taken prophylactic treatment. This fact has been explained to the crew in the course of lectures and instructions. There were 2 cases of gonorrhea, 3 of chancroid, and 2 of syphilis.

Lieut. Commander J. T. Boone, Medical Corps, United States Navy, reporting for the U. S. S. *Mayflower*, states that the venereal disease rate is gratifyingly low. There are various reasons for that, among others that men of the type that one medical officer characterized as "brig boys" are not long tolerated in the crew. Lieut. Commander Boone believes that the policy of transferring acute venereal cases to hospital has been a decidedly helpful factor. While it is regretted that a man must thereby lose pay there is no reason why the ship as a whole should be subjected to infection because of the misfortune or indifference of individual members of the crew. The *Mayflower* has not the facilities for properly caring for acute venereal diseases and its mission is such that every safeguard must be taken to keep the ship free of disease.

Lieut. C. C. Yanquell, Medical Corps, United States Navy, medical officer of the United States naval air station, Anacostia, D. C., stated that rather more new infections were discovered at the air station than in previous years. The majority of these cases were among men with less than two years' service. Sources of infection were apparently not organized houses of prostitution or professional prostitutes. Disease resulted from casual friendships. It is difficult to prevent venereal disease following this sort of association with lectures and advice concerning the necessity of prophylaxis.

Lieut. Commander H. Shaw, Medical Corps, United States Navy, reporting for the United States naval air station, Lakehurst, N. J., noted that there were fewer admissions for venereal disease acquired locally in 1926, and that there was greater improvement in conditions than the sick records appear to indicate because more new men than usual were found to be infected upon arrival at the station. In one draft alone there were three marines who had become infected with gonorrhea while en route from their last station. Two men with syphilis and one with chancroid reported from distant points and two men who contracted the disease in a previous year were admitted with syphilis for the first time in 1926. He considers that real progress has been made with courses of instruction. Marine company officers have cooperated in the educational work and prophylaxis has been firmly insisted upon. Two men who deliberately neglected to take prophylactic treatment were disciplined. During the last two months of the year, which included two national holidays and several leave periods, only one case of venereal disease occurred in the marine battalion. The efforts of the medical officer are being supplemented by the activities of others who are striving to make the immediate environment of the enlisted personnel more attractive. Athletic exercises and entertainments have been arranged which will be added inducements to keep off-duty men on the station and free them from the necessity of finding diversion in distant places where temptations would not always be resisted.

Lieut. Commander P. W. Dreifus, Medical Corps, United States Navy, reporting for the marine barracks, navy yard, Philadelphia, Pa., stated that the venereal diseases showed an increase in incidence over the last year. The probable cause was thought to be the great increase in the transient population of the city during the Sesqui-centennial Exposition. Many of the cases were of men reporting in from absence without leave.

The U. S. S. *Arkansas* was at the navy yard, Philadelphia, Pa., during the whole year except the month of December. The venereal disease admission rate, 130 per 1,000, was 30 per 1,000 less than during the previous year. Her medical officer, Lieut. Commander C. R.

Baker, Medical Corps, United States Navy, looked for an increase, in view of the fact that the ship was tied up at a dock in a large city, and the decrease was in his opinion unexplainable. The ratio between syphilis and gonorrhea was 1 to 5.6. The only suggestion we can offer is that with the reduced complement there were proportionately fewer men of the type most likely to contract venereal disease.

The evidence collected in previous years has on the whole indicated that less venereal disease was acquired by the crews of naval vessels while in the home port than in other domestic ports visited for short periods where the men did not have opportunity for becoming well acquainted in the locality. Of course, exceptions to the general rule have not infrequently been noted. According to observations of Lieut. Commander B. F. Norwood, Medical Corps, United States Navy, medical officer of the U. S. S. *Cincinnati*, that ship was exceptional. The medical officer remarked that in home waters, particularly with New York as a liberty port, and it may be observed that New York is the home port of the *Cincinnati*, clandestine contact was had by liberty parties with undoubted infectious sources and exposure was seldom reported. Therefore, he states, the greatest percentage of cases were contracted in that port. During the year liberty parties were prompt to report exposure and avail themselves of prophylaxis in foreign ports.

Lieut. Commander W. W. Hargrave, Medical Corps, United States Navy, medical officer of the U. S. S. *Wyoming*, noted higher admission rates for domestic ports than for the foreign ports visited. He considered that the difference in rates was due to longer liberty and leave periods in domestic ports and failure to take prophylactic treatment owing to a false sense of security, while sanitary measures common to most segregated houses of prostitution were regarded as tending to keep the rate low in foreign ports. The records of the ship showed in 1926, as they did the previous year, that the venereal disease admission rate was much higher in home ports than in the Panama Canal Zone. For the whole year the admission rate was only 76 per 1,000. There were 66 cases of gonorrhea, 12 of chancroid, and 7 of syphilis. In January, while the ship was in New York, there were 13 admissions on account of venereal disease. From January 26 to April 28 the ship was in Panama Canal Zone and West Indian waters. She was in the Panama Canal Zone from February 4 to March 17. During that period there were 2 admissions for syphilis, 1 for chancroid, and 6 for gonorrhea. In the month of May there were 17 admissions for venereal disease while the ship was in Philadelphia. In July, 10 admissions were recorded. The ship visited Newport, R. I.; Marblehead, Mass.; Portland, Me.; and Charleston, S. C.; carrying midshipmen. The 10 admissions occurred

while the complement was reduced by over 400 men to make room for the midshipmen.

Lieut. Commander E. A. Stephens, Medical Corps, United States Navy, medical officer of the U. S. S. *Marblehead*, remarked that the venereal-disease problem appears to be as acute as ever in spite of the constant repetition of the dangers, mention of consequences, and the application of preventive measures. He continues: "The home yard of this ship is Boston, where conditions appear to be unusually bad. This is especially true in summer time, when it is found by inquiry most of the gonorrheal infections are acquired at the various beaches and in Boston Common. The girls are not prostitutes; rather they are mill girls, domestics, etc., who frequent these resorts for pleasure only. Bootleg whisky is easily obtainable, and after a period of several months in the Tropics the venereal curve shows a rise that is almost perpendicular. Experience with the prophylactic tube seems to indicate that it is not so effective as a gonococcocide as it is against the chancroidal bacillus and *Treponema pallidum*. Of course, one has to rely upon the statements of the men, and accurate data are difficult to obtain."

In view of the criticism of conditions in Boston it is interesting to note that the venereal-disease rate for the whole year 1926 was only 63 per 1,000, a very low rate for a cruising ship. The ratio between syphilis and gonorrhea was 1 to 9.

In this connection the record of the U. S. S. *Florida* is of interest. That ship spent the whole of 1925 and all of 1926, except November and December, at the Boston Navy Yard. The venereal-disease admission rate for 1926 was 79 per 1,000 and the ratio between syphilis and gonorrhea was 1 to 8.3. The ship was undergoing modernization and the complement most of the time was about 350, increasing to 711 in June, 1,012 in September, and to more than 1,100 in October, 1926. Admission rates per 1,000 per annum, by months, were as follows:

January	70	July	79
February	0	August	177
March	153	September	12
April	63	October	42
May	66	November	55
June	236	December	55

For the year 1925 the venereal-disease admission rate was 172 per 1,000.

Commander W. E. Eaton, Medical Corps, United States Navy, medical officer of the *Florida*, thought the decrease in the admission rate for 1926 was due in large measure to two things; first, an energetic educational campaign by lectures, posters, pictures, and

other means instituted by the commanding officer, supported by the executive officer and the medical officer during the summer and fall; and second, concentration on athletics of all forms, especially in the autumn months. With interest in various games stimulated, large numbers of men took part in or attended games. A general policy of getting all hands into athletics by arranging games between interdivisional teams rather than by concentrating on a few ship teams, appeared to keep the men together and interested in their own affairs by which they were more entertained than by clandestine amusements in the civil community. Excellent moving picture shows and boxing and wrestling contests on board ship also helped the situation at no personal expense to the man. The system of double prophylaxis is followed. Upon applying for them, prophylactic tubes are furnished men when going ashore. The venereal-disease treatment room is open for prophylactic treatment of men returning from liberty. General Order No. 69, as amended, is complied with, men being reported for disciplinary action for failure to take prophylaxis if venereal disease develops.

The medical officer of the U. S. S. *Nevada*, Lieut. Commander G. D. Hale, Medical Corps, United States Navy, reported that more than double the number of venereal-disease admissions were recorded during the months of January and February as in any other two consecutive months. The greater part of the first two months of the year was spent at the navy yard, Puget Sound, Wash. The *Nevada's* admission rate in 1925 from venereal disease was 133 per 1,000 and in 1926 the rate was 175. The medical officer attributed the increase in 1926 to the fact that no extended cruises were taken and no ports new to the personnel were visited.

The U. S. S. *Arizona* was at the navy yard, Puget Sound, Wash., from November 2 to December 17, 1926. The medical officer of the *Arizona*, Commander E. C. White, Medical Corps, United States Navy, wrote, "During the past year there has been an apparent improvement in the venereal-disease situation in the vicinity of Bremerton, due probably to the energetic campaign of the district medical officer to have all infected women traced and isolated. During the recent six weeks' period at the navy yard only 14 cases of venereal disease were acquired as compared with 79 during a similar period the year before."

Capt. T. W. Richards, Medical Corps, United States Navy, district medical officer, thirteenth naval district, furnished the following information regarding venereal-disease control measures:

"Upon removal of staff headquarters from West Seattle to Pier 1, Seattle, the Navy first-aid and prophylactic station, which up to that time had been maintained in the Grand Trunk Terminal Dock

building, the Seattle terminal of the Bremerton ferries, was also moved to Pier 1. While the distance from the ferry terminal to the present location is but a few hundred feet, and despite the publicity given the change of location, six months' trial, with an average of only one applicant for prophylactic treatment per month, demonstrated the inadvisability of continuing its operation, which required the exclusive services of two Hospital Corps men. However, during the fleet's sojourn in Puget Sound waters this last summer the station was open at all times for the convenience of the men of the fleet. The prophylactic station signboards have not been removed, and during office hours any applicant can be cared for by the chief pharmacist's mate on duty in the district medical office, which is in the room adjoining. The Army has also discontinued the operation of a venereal-disease prophylactic station in Seattle. The city commissioner of health has continued to operate a prophylactic station in the city detention hospital located in the old courthouse building, which is open to all. The method of disinfection recommended by the Army medical officer at Fort Lawton is followed.

"The district circular letter requiring the reporting of all venereal infections occurring among the naval personnel within the district, by all activities and visiting ships, is still in effect. The number reported during the past year has been rather large because of the presence of the fleet in Puget Sound last summer. The following is a list of the cases reported:

Infected in Seattle-----	Chancroid -----	15
	Gonococcus infection-----	137
	Syphilis -----	13
Infected in Bremerton-----	Chancroid -----	7
	Gonococcus infection-----	14
	Syphilis -----	2
Infected in Tacoma-----	Chancroid -----	6
	Gonococcus infection-----	18
	Syphilis -----	3
Infected in Portland-----	Chancroid -----	1
	Gonococcus infection-----	3
	Syphilis -----	0
Infected in Bellingham-----	Chancroid -----	4
	Gonococcus infection-----	11
	Syphilis -----	2
Infected in Everett-----	Chancroid -----	1
	Gonococcus infection-----	8
	Syphilis -----	0
Infected in Port Angeles, Wash-----	Chancroid -----	1
	Gonococcus infection-----	16
	Syphilis -----	2
Infected in Kent-----	Chancroid -----	1
	Gonococcus infection-----	0
	Syphilis -----	0

"With regard to infections reported as contracted in Seattle, in 42 instances the reports were considered to furnish sufficient information concerning the infecting women that they might be identified and located by the police department and then placed under compulsory treatment and confinement in quarantine if such measures should be considered necessary by the city health commissioner acting under State health department regulations which have the full force of law. Accordingly, copies of the reports in those cases were forwarded to the police department. In every case where the necessary information was given, the infecting individual was arrested and given proper treatment by the health department. The district medical officer was informed by letter from the chief of police of the results of blood tests and whether smears examined were found positive or negative. Forty-one different hotels and apartment houses were mentioned in the 165 reports of venereal infections contracted in Seattle."

TWO DEATHS FOLLOWING INOCULATION WITH B. TYPHOSUS VACCINE

A recruit, 17 years old, died at the naval training station, San Diego, Calif., during the night of December 30-31, 1926, as the result of his third inoculation of antityphoid vaccine, administered about 12.30 p. m. December 30.

The ascertainable facts as determined by a court of inquiry are published for the information of all medical officers in order that they may know a death has been caused by straight typhoid vaccine, and also that they may bear in mind the fact that while the administration of antityphoid vaccine is almost devoid of risk, in rare instances alarming symptoms may follow an injection even when the vaccine contains only a single bacterial antigen—a killed culture of typhoid bacilli.

When the issue of triple vaccine to the naval service was discontinued and the employment of straight typhoid vaccine was resumed in November, 1924, the precaution was taken to require that records be kept of inoculations and attending severe reactions. Consequently, it is possible now to estimate the probable risk of severe reactions from a fairly large volume of data.

The numbers of inoculations and the numbers giving rise to severe reactions in the Navy and Marine Corps between January 1, 1925, and February 28, 1927, are shown in the following table:

	First-course inoculations				Second-course inoculations				Grand total
	First	Second	Third	Total	First	Second	Third	Total	
Number administered.....	54,793	56,143	55,719	166,655	20,515	19,504	18,785	58,804	225,459
Moderately severe reactions.....	988	1,179	660	2,827	279	220	144	643	3,470
Per cent.....	1.80	2.10	1.18	1.70	1.36	1.13	0.77	1.00	1.54
Reactions requiring admissions to sick list.....	342	216	103	661	37	46	40	123	784
Per cent.....	.62	.38	.18	.40	.18	.24	.21	.21	.35

NOTE.—There were 69,054 complete courses of three inoculations each.

In most of the rare cases where death follows the administration of antityphoid vaccine it is probable that careful inquiry will disclose conditions and circumstances which, if observed in time, would have led to precautions sufficient to prevent fatality.

That is true of the following case, although the evidence taken by the court showed that no blame could be attached to anyone except the victim himself, and it would be preposterous to claim that a recruit suffering a severe reaction is responsible for not receiving close observation and treatment necessary to insure recovery.

The boy in question apparently did not realize he was seriously ill, and although he was taken to the detention camp dispensary in the afternoon, about four hours after he received the injection, the evidence obtained makes it clear that he did not see a responsible Hospital Corps man. He returned to his tent, telling the boys who accompanied him that he was advised to do so. Two boys belonging to his company assisted him. They did not enter the dispensary.

The company commander, a chief signalman, who was acting as officer of the day in the detention camp, met the boys while they were on their way to the dispensary. He observed that the victim was very sick and directed his companions to take him to the detention camp dispensary. After the evening meal, probably about 6.30 p. m., the company commander went to the sick bay and asked, "What is the diagnosis in the case of the boy I sent over here a little while ago?" Unfortunately he did not name the boy.

The Hospital Corps man in charge of the dispensary, a pharmacist's mate, second class, left the dispensary, properly enough, at about 4 p. m. and went to the main station to return unused vaccine before going to supper. He returned to the detention camp dispensary about 6 p. m. and saw a number of patients at evening sick call between 6 and 6.30 p. m., among them three boys with colds which he thought had been aggravated by the typhoid vaccine administered earlier in the day. He sent them to the main dispensary in accordance with established practice. One or more boys who had mild reactions were directed by him to return to their tents and turn in. The system followed for keeping track of patients was to make

out two cards for each boy sent to the main dispensary; one to be sent to the main dispensary and another for the company commander's information. Cards were not made out unless treatment seemed to be required and therefore cards had not been prepared for the boys who had mild reactions and who were simply advised to go to bed early.

When the chief signalman entered the dispensary and made his inquiry the pharmacist's mate took it for granted he meant one of the three boys whom he had sent to the main dispensary. Unfortunately he did not ask, "What boy?" He had not seen the recruit who died, inasmuch as he was away from the dispensary when the boy was taken there about 4.30 p. m., and he did not know that any one had been there while he was at supper. Consequently, he told the chief signalman it was only a typhoid reaction. The latter replied, "That is all I want to know." The station was in the midst of an outbreak of cerebrospinal fever, and company commanders as well as Hospital Corps men and medical officers were on the alert to detect cases at the earliest possible moment. No one up to that time had felt any concern over typhoid prophylaxis. The chief signalman had immediately thought of meningitis when he met the boy and his companions before supper and directed them to go to the dispensary, and when told it was only a reaction from typhoid vaccine he was satisfied. Inasmuch as the company commander had visited the dispensary, the pharmacist's mate did not deem it necessary to send him a card covering the case of the boy whom he thought the inquiry concerned and whom he had sent to the main dispensary.

Thus, it happened that the boy who died before morning was not seen by the pharmacist's mate, and the company commander merely satisfied himself that he had gone to bed, taking it for granted that he had been seen by the Hospital Corps man and was not in need of treatment.

It is surprising that his tent mates did not report his condition later in the evening. The evidence showed that the boy had presented such symptoms of alarming illness before midnight as would have impressed anybody of common sense with the necessity for medical attention. It thus appears that untrained boys in their teens can not be depended upon to exercise good judgment under such circumstances. They told him he ought to go back to the dispensary, but when he said he didn't want to they let it go at that. One of them got an extra blanket and put it over him because he was chilly. Later it was observed that he had high fever, and the blanket was off. One of the recruits got up during the early morning hours to urinate and heard a "rustling noise" over by the sick boy's cot, but he went back to bed without looking to see how the boy was.

When all hands were called in the morning he was found dead. It was considered that death had occurred between 2.30 and 5.30 a. m.

Stripped of details, the facts are that a boy who was given his third inoculation, first course, of antityphoid vaccine at 12.30 p. m. on a certain day began to have a severe general reaction in three or four hours, developed alarming symptoms before midnight, and died before morning, without being observed by anyone with enough judgment and common sense to know that he was urgently in need of medical treatment.

Obviously; administrative methods should be adopted by all naval organizations which will insure that men who develop fever after inoculation will be placed under the constant observation of an experienced Hospital Corps man in a dispensary or sick bay, in order that a medical officer may be notified and promptly visit the patient in case alarming symptoms develop suddenly. The few fatal cases of which we have knowledge indicate that alarming manifestations may develop quite suddenly. There is some reason for believing that a full and timely dose of a potent preparation of adrenalin chloride may prevent a death that will occur without it.

The primary cause of death in this case was charged as anaphylaxis, typhoid vaccine. It is of course open to question whether the reaction in such cases is essentially the same as the classical horse serum-guinea pig phenomenon of anaphylactic shock, or whether the result is due primarily to toxic action of the bacterial substance in the case of a person highly susceptible but not previously sensitized by the specific antigen. These questions need not be considered here.

Post-mortem examination was made partly for the purpose of determining whether cerebrospinal fever was the cause of death. There was no indication of that disease. The findings were general cyanosis; contractures of hands and feet; congestion and slight edema of the brain; and congestion of the lungs, liver, spleen, and kidneys. Twelve hours after death the blood had not clotted.

It is not known whether the deceased had previously had typhoid fever.

There are certain other features about this case as disclosed by testimony before the court of inquiry that should be mentioned. One of the Hospital Corps men who was assisting in giving the injections the day the deceased received his third inoculation, remembered that he had been quite sick after his second inoculation and the Hospital Corps man said afterwards that he was particularly impressed, as he observed the boy in line awaiting his turn, by his small size and the thinness of his arm. He said the boy appeared to be undersized, frail, and in poor physical condition. Notwithstanding, he was given a full 1 cubic centimeter dose, and, as brought out

above, there was no definite provision for watching the effect. The testimony did not indicate whether the vaccine was injected under the direct supervision of a medical officer. Such supervision is expected when possible. The medical officer should exercise discretion in the occasional case where 1 cubic centimeter is obviously a much greater dose in proportion to body weight than it is for most men. Due consideration should also be given to a history of severe reaction following a previous inoculation.

The testimony also indicated that a 10-cubic-centimeter syringe was used for giving the antityphoid inoculations, and although the Hospital Corps man who made the fatal injection stated positively that he did not inject more than 1 cubic centimeter, this must be regarded as unsafe practice. According to the testimony, the practice was to fill the syringe and give multiple inoculations with a single barrel full.

It was brought out in the testimony that there were two recruit hospital apprentices in the detention camp dispensary, at least part of the time, during the afternoon of December 30. The pharmacist's mate, second class, in charge, remembered the name of one who was in the dispensary when he left at about 4 p. m. That man testified he did not see the afflicted boy when he was brought to the dispensary between 4 and 4.30 p. m. There was nothing in the testimony to show who the other recruit hospital apprentice was or whether he did or did not see the boy. The latter told his companions when he came out of the dispensary that he had been advised to go to his tent and turn in. If he told the truth there was a situation that is not free from risk. Steps should be taken to make sure during such periods as when there is no experienced Hospital Corps man in a dispensary that an untrained member of the corps will not act upon his own judgment. Such hospital apprentices should be required to hold men applying for treatment until the return of an experienced pharmacist's mate or, if the men will not stay, to note their names and inform the Hospital Corps man in charge of the circumstances.

The deceased probably felt that no treatment was necessary and he only wanted permission to go to bed in his own tent. It seems clear that he did not wish to consult anybody, but provision should be made to insure observation of a sick boy regardless of his own desires.

In connection with the case described above, we should mention the case of a gunnery sergeant, United States Marine Corps, 35 years old, who died seven hours after the third of a series of antityphoid inoculations given seven days apart. He was serving with the Constabulary Detachment, United States Marines, in Port au

Prince, Haiti. He had not experienced any discomfort after either of the preceding injections of the course. The third injection, 1 cubic centimeter of vaccine containing approximately 1,000,000,000 dead typhoid bacilli, was given December 13, 1926, about 1.40 p. m. About 3 p. m. he had a chill. He was seen in his home by a medical officer at 6 p. m. He complained of fever and headache. He was seen again at 7.45 p. m. His temperature was then 102° F. and his pulse rate, 100. He was mentally bright and did not appear to be seriously ill. About an hour later his wife, who was in the next room, heard him gasping. He died a few minutes after that.

At postmortem examination the heart was found distended with blood. There was a considerable excess of subpericardial fat. The aortic valve was sclerosed and there were numerous plaques. The mitral valve was sclerosed and thickened. The spleen was greatly enlarged and it weighed 620 grams.

The medical officer thought the cause of death was acute dilation of the heart resulting from arteriosclerosis and myocardial damage with the febrile reaction from the inoculation a contributory factor. In the vital statistics of the Navy the primary cause of death is recorded as "myocarditis and valvular heart disease, combined lesions, aortic and mitral" and the secondary cause as "acute dilatation of the heart." It is of course possible that the vaccine was the direct cause.

The gunnery sergeant had served in the Marine Corps 14 years. His health record indicates he received a complete course of anti-typhoid vaccine in 1912 and a second complete course in 1921 after two other injections of an incomplete course the same year. Existing instructions did not require a third course in 1926. Reduction in the number of required courses to two series of three inoculations for persons in the naval service was based upon evidence suggestive of increasing risk with repeated courses. The instructions, however, do not proscribe additional courses. In fact, exposure hazards likely to be encountered by members of expeditionary forces are not infrequently considered to justify reimmunization even when two series of inoculations have been taken previously, especially if the last was given three, four, or more years before.

The vaccine used in 1912 and in 1926 was straight typhoid. That used in 1921 presumably contained, *B. typhosus*, one strain of *B. paratyphosus A*, and one strain of *B. paratyphosus B*.

The two cases cited are the only ones occurring in the naval service in which death could in any manner be attributed to antityphoid inoculations since November, 1924, when the issue of straight typhoid vaccine was resumed. Four deaths attributed to triple vaccine oc-

curred between January 1, 1918, and December, 1924. Nearly a million men must have been inoculated during that period, but actual count was not taken.

REPORT OF AN OUTBREAK OF CEREBROSPINAL FEVER AT THE UNITED STATES NAVAL TRAINING STATION, SAN DIEGO, CALIF., DECEMBER, 1926-JANUARY, 1927

The following is a summary of a comprehensive report prepared by Commander J. B. Kaufman, Medical Corps, United States Navy, senior medical officer of the station:

December 28, 1926, two cases of cerebrospinal fever developed; the first appearance of the disease during the winter. Both patients reported ill at morning sick call and were thought to have catarrhal fever, which was quite prevalent in San Diego, although the incidence on the station at the time was less than usual. Early that afternoon symptoms suggestive of meningitis developed in both cases and the boys were immediately transferred to hospital where the diagnosis was established by lumbar puncture and the discovery of meningococci in the cerebrospinal fluid.

One of the patients came from the transfer unit which is made up of men who have completed their training. The men there were quartered in open wooden cubicles with canvas curtains forming the upper portions of the sides. No other case developed in that unit. The patient enlisted in Seattle, Wash., and arrived at the station August 20, 1926.

The other patient came from Company C-1, quartered in Barracks B-4, main unit. So far as could be ascertained he had not been in contact with the first-mentioned patient unless by chance they came together in the moving-picture hall in the main unit, which was usually filled, since the pictures shown were very good. That man enlisted in Los Angeles, Calif., and arrived at the station November 14, 1926.

These cases proved to be first of an outbreak which in all included nine cases occurring on the dates indicated in the following table:

	Date admitted	Age	Place enlisted	Place quartered	Date arrived on station
1	Dec. 28, 1926	18	Seattle.....	Company A-3 (tent unit) tent No. 10.....	Aug. 20, 1926
2	.....do.....	18	Los Angeles.....	Company C-1 (main unit) Barracks B-4.....	Nov. 14, 1926
3	Dec. 29, 1926	27	San Francisco.....	Company C-2 (main unit) Barracks C-2.....	Nov. 20, 1926
4	Dec. 30, 1926	18	Seattle.....	Company C-4 (main unit) Barracks C-1.....	Dec. 3, 1926
5	.....do.....	20	.....do.....	Company C-2 (main unit) Barracks C-2.....	Nov. 20, 1926
6	Jan. 1, 1927	18	.....do.....	Company C-3 (main unit) Barracks B-2.....	Aug. 5, 1926
7	Jan. 10, 1927	19	.....do.....	Company C-2 (main unit) Barracks C-2.....	Nov. 20, 1926
8	Jan. 23, 1927	17	San Francisco.....	Company C-3 (main unit) Barracks B-2.....	Nov. 27, 1926
9	Jan. 24, 1927	17	San Diego.....	Company C-4 (main unit) Barracks C-1.....	Nov. 29, 1926

No case developed among recruits undergoing incoming detention in the tent unit which is separated sufficiently from the main unit to prevent contact except possibly in the messing building used in common by all detachments. Recruits from the detention camp are marched there for meals. That arrangement is regarded as very unsatisfactory. It is not always possible to be sure that contact will not take place between detention unit men and men of the main unit. The epidemic at the station the previous year began among recruits quartered in the incoming detention camp and the infection was probably introduced into the main unit by carriers who had completed the detention period.

As shown by the table, three of the cases in this year's outbreak developed in members of Company C-2, quartered in Barracks C-2; two cases occurred in Company C-3, quartered in Barracks B-2; and two cases in Company C-4, quartered in Barracks C-1. As noted above, secondary cases did not occur in the units from which the first two patients came.

The following diagram indicates housing arrangements on the station:

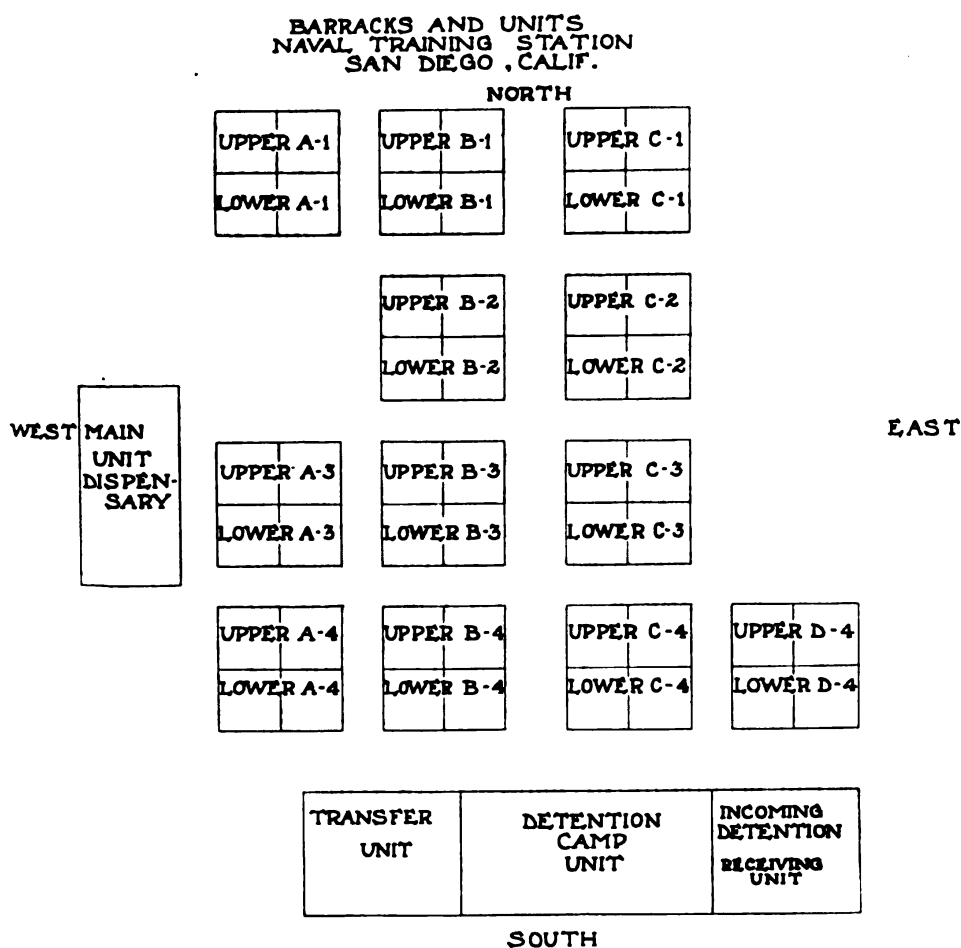


FIG. 1

Both the "A" and "D" rows of buildings are incomplete, but space is left for future construction. Building A-1 is used for teaching purposes. The others are barracks in which the companies and members of school units are quartered.

Companies are formed while the recruits are undergoing incoming detention, and they vary in size from 75 to 110 men, depending upon circumstances. The letters A to D and the numbers 1 to 6 are used to designate companies. The company commander forms his company in detention, transfers with it to the main unit, and remains its commander until it is broken up at the end of the training period and the men have been transferred to a school or sent to the transfer unit, as the case may be. A newly formed company is not ordinarily given the same designation as one already existing, but when recruiting is active it is possible to have two companies with the same designation. For example, there may be an A-1 forming in the detention camp while there is still an A-1 in the main unit, but there never are two companies designated alike in the main unit. A company does not necessarily occupy the barracks having the same designation. Companies vary in size, and unless a company comprises 100 men or more it may not fill a barracks. An average company usually occupies three dormitories of a barracks building, the other dormitory being occupied by another company, which also occupies two dormitories of another building. The buildings are two stories high. The dormitories are known as lower north, lower south, upper north, and upper south. Overlapping occurs for various reasons, principally due to differences in the size of companies formed in the detention camp, depending upon the numbers of recruits arriving at the station from day to day and the practice of conforming to a definite detention period. Members of two companies never occupy the same dormitory. It will be observed that no barracks building is designated A-2. It is only by chance that Company A-2 of a given period occupies the same dormitories as a preceding Company A-2.

In the detention and transfer units the men are quartered in tents, or rather in cubicles covered with canvas, arranged in rows. Eight men as a rule occupy a cubicle. They sleep on iron cots. The cubicles are thought to furnish very unsuitable housing with inclement conditions. The transfer unit cubicles differ from those of the incoming detention camp in having a frame wooden roof with tar paper covering instead of canvas. When communicable disease threatens the occupants of cubicles are reduced, if possible, from eight to six.

During the early part of the outbreak companies were quarantined in dormitories, as follows:

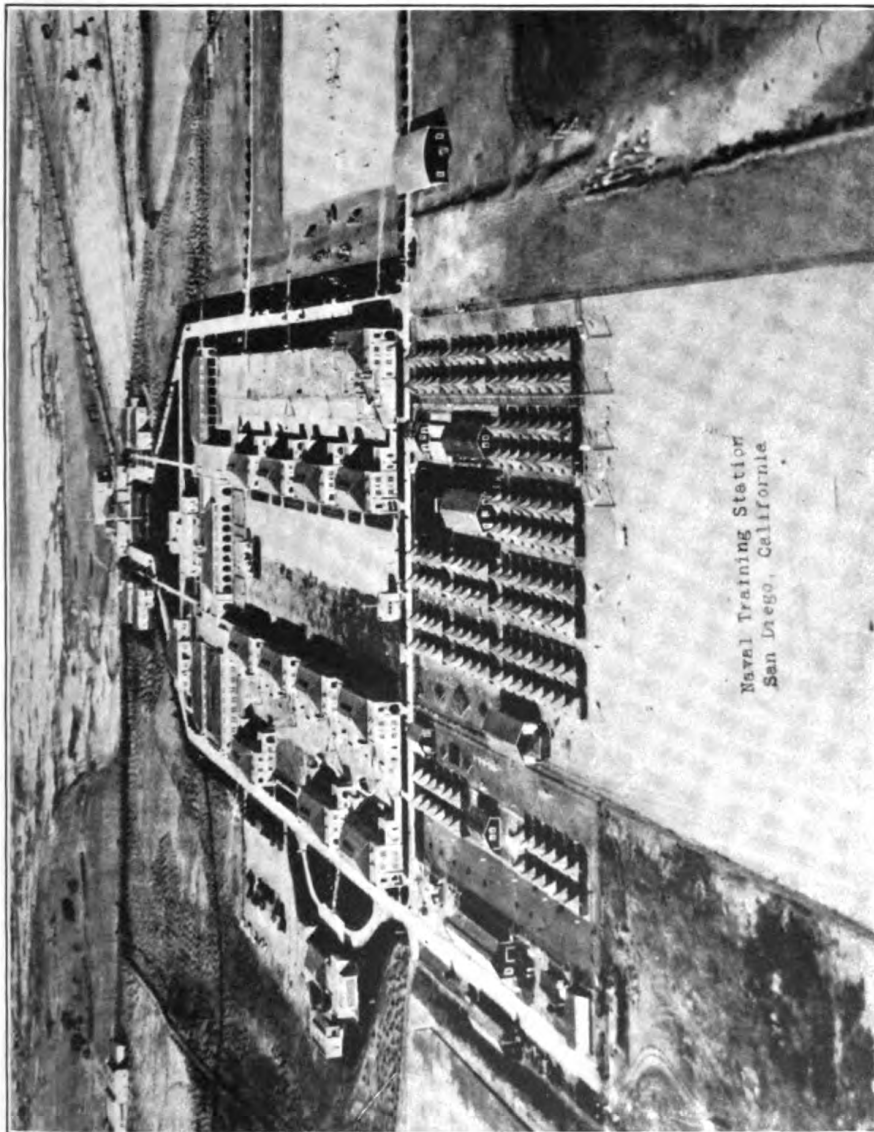


FIG. 2.—SHOWING ARRANGEMENT OF BARRACKS AND CAMP AT NAVAL TRAINING STATION, SAN DIEGO, CALIF.

Company C-4 in Barracks C-1 (upper and lower north and upper south). Lower south was occupied by men returning from leave. They were transferred to tents in the receiving unit, leaving the dormitory vacant during the quarantine period.

Company C-3 in barracks B-2 (all four dormitories).

Company C-2 in barracks C-2 (all four dormitories).

Company C-1 in barracks B-4 (all four dormitories).

As soon as the presence of cerebrospinal fever was recognized each company in which the disease appeared was restricted to its dormitories. With the appearance of 6 cases in five days—2 cases the first day, 1 the second, 2 the third, and 1 the fifth—an extensive outbreak might well have been expected, especially as the cases were not confined to any particular part of the station but developed in five different companies quartered in five different buildings. No further cases occurred on the station, however, for 23 days, when two other men on the main station were attacked, January 23 and 24—one in Company C-3, in which a case had developed January 1, and the other in Company C-4, in which a case had been discovered December 30. The outbreak ended with these.

Meanwhile, on January 10, cerebrospinal fever developed at the United States Naval Hospital, San Diego, Calif., in the person of a recruit belonging to Company C-2 who had been transferred to hospital with measles January 1. It is not known whether he was a meningococcus carrier when transferred; cultures were not taken from quarantined companies until after January 1. Studies of previous epidemics of cerebrospinal fever occurring at naval training stations have shown that carriers transferred to hospital with other acute infectious diseases, particularly measles and influenza, have occasionally come down with meningococcus meningitis during the acute stage of the primary disease or during convalescence.

It was difficult to maintain rigid quarantine. Inasmuch as there were not separate mess halls for the different barracks, the best that could be done was to set apart certain messing spaces for men from quarantined barracks and establish double messing to avoid contact between the several quarantined companies. Mess gear was sterilized under supervision. Motion-picture shows were discontinued and gatherings in general were prohibited. Drills were reduced to a minimum to avoid fatigue, but a moderate amount of physical exercise was encouraged. All liberty was stopped and visitors were excluded. Blue uniforms were prescribed for all hours and extra blankets were issued for the use of men in the transfer unit. Ponchos were also used when necessary in order that the men might keep warm while sleeping. The buildings of the main unit were steam heated.

Inspections of barracks and personnel were held daily. All precautions were taken to detect new cases at once should suspicious symptoms develop. Simple instructions were printed and distributed to inform the men that the situation was serious and teach them how the disease is spread, how it may be recognized, and what prophylactic measures were required.

Quarantine was continued until January 11, when 10 days had passed without the appearance of another case. During the quarantine period good weather fortunately prevailed, with bright sunshine every day and clear but cold nights. In the opinion of the medical officer continuous sunshine was the most important limiting factor apart from natural immunological reactions.

When it became apparent that an outbreak was imminent the naval hospital was notified, and as soon as arrangements could be made the culturing of all men belonging to companies in which cases had developed was begun. In all 594 men were swabbed. Twenty-three cultures were positive and the men yielding them were transferred to hospital, where they were isolated as carriers. None of the carriers developed cerebrospinal fever.

Cultures were taken and carriers were detected in companies as follows:

Organization	Cultures taken	Carriers detected	Per cent.
Men in transfer unit.....	331	16	4.8
Company C-1.....	70	1	1.4
Company C-2.....	46	2	4.3
Company C-3.....	68	2	2.9
Company C-4.....	79	2	2.5

The transfer unit showed the highest percentage of carriers. One of the two cases of cerebrospinal fever simultaneously discovered the first day of the outbreak, December 28, developed in that unit. It is interesting to note that no other case occurred among the 331 men swabbed, 16 of whom proved to be carriers. The other man attacked on the first day of the outbreak came from Company C-1, which was found to have the lowest percentage of carriers—only one detected among 70 cultured. No other member of that company contracted the disease. The numbers of men examined were too small to justify any definite conclusions from the bacteriological findings, but it is rather surprising that so few carriers were found under the circumstances, in view of the results obtained when cerebrospinal fever was prevalent in naval organizations at Great Lakes, Ill.; Norfolk, Va.; and Boston, Mass., during the World War.

Company C-2, which had the greatest number of cases—three—showed next to the highest percentage of carriers, but, as the table

shows, only two carriers were detected. Company C-3 had only one case when the cultures were made, but another case was discovered January 23. The last case of the outbreak occurred January 24, in Company C-4, which also showed two carriers when the cultures were made after the first six cases of cerebrospinal fever had rapidly developed.

The most important reason for making large numbers of cultures is that such studies may lead to findings of epidemiological interest. Past experience indicates that little if any preventive effect will result from the discovery of carriers. It would have been interesting if control groups of recruits in barracks not under quarantine had also been cultured.

The disease most likely was introduced into the training station (a) by a recruit who became a carrier while on leave or liberty, possibly by an undetected carrier in some organization not cultured, or (b) by a visitor, officer, or enlisted man other than a recruit. Only six of the known carriers had been on the station less than 60 days, and the one who had most recently arrived reached the station December 2, 1926. It is, of course, not known whether he was a carrier when he arrived. He came from Los Angeles, Calif. It seems highly probable that the outbreak would have begun earlier if a recruit introducing a virulent strain of meningococci from the city in which he enlisted was responsible, and the chances are the disease would have appeared first in the detention camp if that were the case. The focus of infection was probably in San Diego or in some other locality visited by recruits.

For about two weeks before the outbreak began the weather was unusually wet and cold for San Diego. The rainfall during the month of December was 3.9 inches or 29.5 per cent of the total rainfall for the year 1926.

The man belonging to the transfer unit who came down with the disease on the first day of the outbreak was living with six other men in a cubicle which had a board floor, a tar-paper-covered wooden roof, wooden sides to a height of 4 feet, and canvas curtains. The ventilation was excellent and the cubicle was not overcrowded. None of the other six occupants yielded a positive culture of meningococci. The other cases of cerebrospinal fever were in men quartered in well-ventilated and steam-heated barracks of the main unit.

Neither overcrowding in barracks nor fatigue seemed to be a causative factor.

The senior medical officer observed that the moving-picture hall on the station was too small and in the winter months especially unsuited because of the lack of facilities for heating. There was overcrowding in a badly ventilated, cold room. He thought these factors should be considered in reflecting upon the cause of the outbreak. He also

mentioned that a Santa Claus party was given in the recreation building December 22 for the children of officers and enlisted men attached to the station. The hall was moderately crowded. There were about 150 children present accompanied by parents, relatives, and friends, as well as an indeterminate number of recruits. The room felt chilly. So far as could be ascertained none of the recruits who contracted cerebrospinal fever attended the party.

There was general contact with the civilian population through liberty. There was more likelihood that meningococci would be brought into the station during the Christmas holidays than at other times.

No case of cerebrospinal fever in the city or county of San Diego was notified during November or December, 1926, but a case was reported in the city January 5, 1927. As Rosenau has observed, for every case of cerebrospinal fever there are usually from 10 to 30 meningococcus carriers in the community and not infrequently more. It is reasonable to assume that foci of infection were present in the latter part of December.

As mentioned above, the seventh case of the outbreak, recorded as of January 10, developed at the United States Naval Hospital, San Diego, Calif., where the patient had been under treatment for measles 10 days. The third case of the outbreak recorded as beginning December 29, 1926, was that of a recruit who became ill with the disease that day while on leave at his home in Santa Cruz, Calif. The report did not mention when he went on leave but presumably he left the station Friday, December 24, the day before Christmas. Very likely he was exposed on the station prior to that date.

From the clinical standpoint, most of the cases were very severe. Four of the nine men attacked, died on the second, third, fourth, and fifth day respectively after the onset of symptoms. The last man who developed the disease was still slightly delirious on the fifteenth day of his illness when the report was written although he had received ten 45-cubic centimeter injections of antimeningococcus serum up to that time.

With regard to mode of onset, in seven of the nine cases the first symptoms were such as might be caused by influenza or a cold. After from a few to 24 hours, signs referable to meningeal involvement appeared. In one case the disease began with headache and without fever or naso-pharyngeal symptoms. After a few hours the temperature rose to 104° F. and stiffness of the neck, positive Kernig's sign, and other indications of meningitis appeared.

The fifth case of the outbreak was exceptional in that there were no symptoms of meningitis other than restlessness and exaggerated knee jerks. Lumbar puncture was performed. The cerebrospinal

fluid was under increased pressure and was cloudy but meningococci were not found.

In the other eight cases meningococci were found in the cerebro-spinal fluid.

The seventh case, as stated, developed in the naval hospital where the patient had been under treatment for measles 10 days. It was a typical case.

Leucocyte counts were recorded for six of the patients as follows: 17,500; 27,200; 9,200; 30,800; 16,000; 12,000. The patient whose cerebrospinal fluid although cloudy apparently contained no micro-organisms, had the low count. One of the patients who died had a white count of 27,200 and one a count of 16,000. Blood counts were not recorded in the other two fatal cases.

The 27-year old man was he who developed the disease at his home while on leave. He was taken sick at about 4 a. m., December 29, less than 24 hours after illness began in the cases of the two boys who first developed the disease on the training station. He was possibly exposed at the same time they were, although they belonged to three different companies. His mother thought he had influenza. Other members of the family had recently had that disease. In the afternoon he became delirious and a physician was called in. By evening he was unconscious. Meningococci were found in his cerebrospinal fluid. A decided petechial eruption covering the entire body was a feature of the case. He never regained consciousness and died January 2, 1927.

The presence of an exanthem was not noted in any of the other cases.

**REPORT OF AN OUTBREAK OF SCARLET FEVER AT UNITED STATES
NAVAL TRAINING STATION, HAMPTON ROADS, VA.**

By Capt. C. F. ELY, Medical Corps, United States Navy

Sixty-nine cases reported as scarlet fever occurred at the training station between November 1, 1926, and March 25, 1927, distributed by months as follows:

	Cases
November	4
December	0
January	33
February	9
March	23
Total	69

The diagnosis in practically all cases was confirmed by the naval hospital, Portsmouth, Va. In border line or doubtful cases, and there were a number, the "blanching test" using antitoxin, was relied upon at the hospital.

Cases were admitted from different activities as follows:

	Cases
Unit "D" (recruit detention).....	4
Unit "B" (recruit training).....	11
Unit "J" (available for detail).....	13
Electrical school.....	15
Machinist's mates school.....	14
Radio school.....	5
Artificers' school.....	6
Marine barracks, naval operating base.....	1
Total.....	69

The average age of patients was 19½ years. Recruits in unit D (detention) are allowed no liberty for three weeks after arrival from recruiting stations. The men of all units eat in one mess hall except the marines, who mess by themselves. Unit D, owing to crowding in the mess hall, was fed at early mess, contact with others thus being reduced to a minimum. The disease was probably introduced from Norfolk, Va., where it has been unusually prevalent this winter.

Health officer's reports show:

	Cases
November.....	29
December.....	14
January.....	26
February.....	26
March.....	16
Total.....	111

At the training station the disease was probably spread through contact in the mess hall. The preponderance of cases in units B and J, electrical school and machinist's mates school is noteworthy. The smaller numbers of cases from the radio and artificer schools are explained by the fact that comparatively few recruits were taking those courses. The men of the different units were separated, one group from another, by reason of the daily routine and they came together only at meal times.

In studying the outbreak it should be considered that 1,755 recruits were received during January and February, 1927. A recruiting drive inaugurated by the department was responsible for the influx which extended our facilities almost to the breaking point. From a sanitary standpoint it would seem that drives of this nature should be conducted if possible only in the late spring and summer months when the expected incidence of disease is low rather than in the winter months when the incidence reaches its peak.

During January and February, when scarlet fever was at its height, influenza was epidemic, and many cases, averaging 16 daily, were being admitted and transferred to hospital. Various other con-

ditions also contributed to increase the percentage of sick. Many of the influenza patients presented rashes which required what might be termed careful discrimination in arriving at a diagnosis in the presence of scarlet fever. The streptococcus is, to say the least, an important factor in the etiology of both diseases. There appeared to be many border-line cases with a tendency to overlapping, which was confusing. Rubella, febrile roseola, and eruptions incidental to disorders of the gastrointestinal tract must always be borne in mind. While some of the cases were typical, a number of the patients had very little fever and few, if any, symptoms other than the eruption. In hospital, desquamation, which is to be expected at the termination of the attack, occurred in but few cases. This might be attributed to the practice of administering scarlet-fever antitoxin at once upon making the diagnosis. It was reported that the antitoxin induced admirable and gratifying response.

In accordance with a request approved by the Bureau of Medicine and Surgery February 2, 1927, material was secured for performing the Dick test and administering immunizing doses of toxin to exposed susceptibles. A total of 649 men were given the Dick test with the following results:

Positive.....	155
Negative.....	392
Doubtful.....	60
Not read.....	42
Total.....	649

Of the 649, 109 were considered previously to have had scarlet fever; 446 were thought not to have had the disease; and no information was obtainable concerning 94.

In reading the results the personal equation of course enters, and there are certain border-line cases which might be called positive by one observer and negative by another. We have adopted a middle course and have recorded these as doubtful—positive or negative.

No case of scarlet fever developed among those giving a clear-cut negative Dick test, but there were several among men whose reactions were read as doubtful. Dick tests made from one to three months after administering immunizing doses of toxin showed 4 positive and 44 negative tests among 48 men who had previously given positive tests. It thus appears that 91.67 per cent of the susceptibles in that small series developed immunity and 8.33 per cent did not. It is believed that the immunization of nonimmunes is a valuable adjunct to the control of the spread of scarlet fever among the Navy personnel.

About 150 men who gave positive Dick tests received a complete course of four immunizing doses of toxin. In no case was there any

marked reaction or any other untoward symptom. None of these men subsequently developed scarlet fever. It is considered that immunization of susceptibles as determined by the Dick test is a reasonably safe and valuable procedure. The possibility of increased susceptibility following the administration of scarlet-fever antitoxin is to be borne in mind.

Scarlet fever and influenza occurring in outbreaks together present many points of similarity. At the training station it was not always possible to apply all scientific aids to differentiation because of insufficient time, transfer to hospital being indicated in cases that were probably scarlet fever.

Inasmuch as both diseases are characterized by the presence of hemolytic streptococci, confidence in the "blanching tests" for diagnostic purposes following an injection of antitoxin into the skin should be guarded.

Editorial comment.—The report suggests that of 69 cases recorded as scarlet fever an indeterminate number really were not scarlet fever. Similar difficulty in excluding other infections has been experienced in previous epidemics among adults.

Sixty-nine cases would represent a greater attack rate than has occurred in a naval organization since the World War, and indeed greater than for any station during the war if an explosive outbreak which occurred at the naval training station, Great Lakes, Ill., be excluded. That outbreak, which consisted of about 200 cases, was due to a common source of infection. Food was contaminated by an infected messman. The epidemic began suddenly, ran its course in a few days, and gave rise to remarkably few secondary cases.

The spread of scarlet fever at the Hampton Roads station this winter was probably due largely to the extensive epidemic of influenza which began early in January. The observations regarding the difficulty of differentiating skin eruptions directly and indirectly caused by influenza are interesting. It is also to be remembered that other factors of epidemiological significance must have had their effect. It is noted that the heavy influx of recruits resulted in taxing the facilities of the station almost to the limit. With a heavy burden imposed on the medical department as a result of increased numbers of recruits and the additional difficulties resulting from the rapid spread of influenza it is not to be expected that the cardinal preventive measures—prompt detection and isolation of new cases of scarlet fever and effective concurrent disinfection—could be applied so effectively as under ordinary conditions.

The history of this outbreak does not seem to affect the validity of conclusions drawn from the epidemiological behavior of scarlet fever in the Navy in previous years, regarding expected incidence

and probable rate of spread when the disease appears on board a naval vessel.

The report indicates that the administration of immunizing doses of scarlet fever toxin to recruits who were positive to the Dick test was a valuable control measure. Perhaps it was, but it should be noted that the necessary materials appear not to have been available until after February 2, 1927. By that time reduction in the incidence of scarlet fever might well have been expected for various reasons. Fundamentally, the biological reactions between the causative agent and an exposed population group tend to limit spread of the disease. The epidemic of influenza was also declining and more effective control might be expected also from greater familiarity of company commanders and recruits with required measures as the outbreak progressed. Weather conditions were also becoming more favorable.

It may be that without the administration of toxin some of the 150 men who had previously shown positive Dick tests would have contracted scarlet fever, but it can not be assumed that they would, even though 23 cases were recorded as occurring in March. Search for susceptibles is, of course, a logical procedure when practicable, and measures to protect known susceptibles from exposure and render them immune are naturally indicated. There can be no argument about the wisdom of taking all steps to control an epidemic that are not contraindicated on the ground of unnecessary interference with work and personal liberty, provided the measures employed are of demonstrated worth. The value of active immunization with scarlet fever toxin has become pretty well established. But in studying any outbreak one should not forget to consider what the result would have been if a certain measure had not been employed. It is the old question of reaching conclusions in the absence of adequate control conditions. There is always the temptation, when an epidemic has ceased, to assume that measures adopted had more preventive effect than they really had.

If expectancy can really be estimated from the epidemiological behavior of the disease in past years, more cases were recorded as occurring in March toward the end of the outbreak than were to be expected at a naval training station, under any but extraordinary conditions, without employing toxin.

Everything considered, it seems logical to conclude that so extensive an outbreak is not likely to occur at any training station unless circumstances interfere with the early detection of new cases and proper concurrent disinfection. An extensive epidemic of influenza is a serious menace and, depending upon foci of infection, is likely

to be accompanied or followed by outbreaks of other communicable diseases, especially cerebrospinal fever, diphtheria, scarlet fever, mumps, and measles.

FATAL POISONING BY ARSENIURETTED HYDROGEN IN THE GALVANIZING SHOP AT THE NAVY YARD, PUGET SOUND, WASH.

December 31, 1926, a civilian employee who had worked in the galvanizing shop at the navy yard, Puget Sound, Wash., for 13 days developed symptoms which proved to be those of poisoning by arseniuretted hydrogen. He died January 8, 1927. Another employee who had worked in the shop about six months was taken sick January 12, 1927. Poisoning was severe enough in his case to cause acute nephritis and considerable destruction of red-blood cells, but he recovered.

The following information was taken from the proceedings of a board of investigation appointed "To inquire into and report upon the existence of conditions and methods of operation which may adversely affect health and safety of employees in the galvanizing shop, navy yard, Puget Sound, Wash.":

The number of men employed in the shop had varied from three or four to eight. Three men had worked in the shop several years—one about 12 years, one about 9 years, and one 3 years—without experiencing any symptoms of poisoning. The work of hot galvanizing metals had been conducted in that yard for about 25 years, and in the building where poisoning occurred for about 12 years, without any case of illness attributable to arsenic.

Several months before, it having been found upon sanitary inspection that fumes lingered in the shop, an additional opening had been made in the ceiling, establishing an outlet through the roof, over the area of greatest concentration of the fumes, and an exhaust blower having capacity to deliver 5,000 cubic feet of air per minute at 1,080 revolutions per minute was installed. That alteration appeared to improve conditions in the vicinity of the galvanizing pot a little, but the fumes, being heavier than air, tended to settle and remain in spite of the overhead exhaust. Before the blower was installed the fumes diffused through natural openings in the sides of the building and remained over the pavement area, at times in such concentration as to obscure the building. The gases, presumably, were not very poisonous then because no employee was made ill.

This shop is part of the building occupied by the smith shop. On the south side there is a door providing an opening 18 by 20 feet when the doors are open. There is also a door in the east wall near the center about as large as the south door. There are several windows in the south and east walls. It was the practice to keep

both doors open as much as weather conditions permitted, especially when heavy work was being handled, but with the wind in certain directions conditions in the shop were made worse by opening the doors. Ordinarily one door was kept wide open and the other was opened to a point giving the best results. The windows were sometimes used, but the doors usually let in all the fresh air that could be handled in the shop. There is a small door in the west wall, near the end of the room, by an acid tank. It is used only to project extra long work into the smith shop. There is also an ordinary door about 3 feet wide in the north wall, communicating with the smith shop. Both doors are kept shut to prevent fumes from passing into the other shop.

Articles made of iron or of mild steel, when received in the shop for galvanizing, if free from paint or previous zinc coating, are placed in a tank and "pickled" in a sulphuric-acid bath which removes oxides and surface imperfections. The articles are then transferred to a water tank where they are washed and inspected. If found properly pickled they are passed to a tank containing muriatic acid.

Steel castings are first pickled in a tank containing a 10 to 12 per cent solution of hydrofluoric acid in water to remove a film of glass that is usually found on the surface. There are certain hazards connected with the use of strong hydrofluoric acid, including the liberation of acid gas and silicon tetrafluoride. The hydrofluoric-acid vat was near an inside wall next to an inside corner where there was relatively little air movement. So far as the arseniuretted hydrogen hazard was concerned, the operation of the hydrofluoric-acid vat was not considered to be of any importance. After treatment with hydrofluoric acid, steel castings are passed to the sulphuric-acid bath, where they receive the same treatment as mild steel or iron fittings. The sulphuric acid is used without changing for 30 to 90 days, depending upon the amount and class of work put through, after which it is dumped and the tank is washed and cleaned.

After pickling in sulphuric acid and washing in water, articles to be galvanized are placed in a vat containing muriatic acid, which acts as a flux, making the zinc adhere more firmly. In many cases powdered ammonium chloride is also sprinkled over the surface and allowed to dry, after which the article is put in the pot of zinc for galvanizing, and then into a water-cooling tank to reduce the temperature of the metal a little. Sal ammoniac is used as a flux both after the article is removed from the muriatic-acid bath and also at the galvanizing pot. Usually the flux actually consists of sal ammoniac and a small admixture of commercial glycerin which forms a liquid scum on the surface of the galvanizing pot.

The muriatic-acid bath was ordinarily changed about every 60 days. The practice was to draw off the acid from the top, remove the residue in the bottom, wash out the tank, return the acid, and strengthen the bath by adding new acid.

Upon investigation it appeared that employees working over and near the hydrochloric-acid bath were especially exposed to arseniuretted hydrogen. Those in the vicinity of the galvanizing pot were also exposed to the hazard, but the danger was probably much less for them. In the muriatic-acid vat, as a result of the solvent action of the hydrochloric acid on a casting, nascent hydrogen is formed at the junction of the dipped metal and the acid. As a result of the strong affinity of the nascent hydrogen for arsenic which was present in considerable amount as arsenic trichloride in the muriatic-acid solution which had been used for some time since the bath was last renewed, arsenic trihydride was formed, chlorine gas also being liberated. White deposits of arsenic trioxide were found on the walls of the shop in the vicinity of the muriatic-acid vat, particularly near the end of the water vat on the inner wall of the room. Dry dust which had settled on a horizontal brace near the muriatic-acid vat was examined and found to contain arsenic trioxide. The dust was potentially dangerous. The shop has a dirt floor, so arsenic was probably mixed with dust from the ground. Other deposits of arsenic trioxide were found on the walls near the sal ammoniac flux table and near the galvanizing pots. These deposits indicated that arsine (arseniuretted hydrogen) had been evolved in quite large amounts. The danger of poisoning from the deposited arsenic trioxide was not considered to be very great.

The muriatic acid which was in the vat when poisoning occurred was found upon analysis to contain approximately 0.05 per cent of arsenic in terms of arsenic trioxide. A sample of unused acid of the same lot as that used to make the bath contained approximately 0.0005 per cent. Another sample taken from a carboy of a new shipment contained 0.0001 per cent. The specifications for muriatic acid followed by the yard do not state the maximum limit for arsenic, but they do state that not more than traces of impurities are allowed. At the navy yard a trace is now defined as an amount below any measurable quantity and the permissible amount of arsenic trioxide has been limited to 0.0001 per cent.

The quantity of arsenic carried into the bath by the muriatic acid was not believed to be the most important source. It appeared that the arsenic content of the metals being galvanized or being prepared for galvanizing was of equal or greater importance, for it was demonstrated that arsenic from castings built up the percentage of arsenic in the bath, little by little. The concentration in the bath was about five hundred times greater than in the acid as issued. This

was undoubtedly a dangerous state of affairs. R. E. Canfield, the assistant chemist of the navy yard, accounted for the findings as follows: Iron ore contains arsenic as an impurity and this eventually finds its way into iron castings. The metal of the casting reacts with the hydrochloric acid, forming nascent hydrogen, which readily attacks arsenic in the casting. Some arseniuretted hydrogen is formed, and inasmuch as arsenic is somewhat soluble in hydrochloric acid, when exposed to the air some of the arsenic of the casting is added to the bath as arsenic trichloride. He believes the saturation point of arsenic trichloride is not attained in the vat because a point of equilibrium is reached, above which the arsenic does not increase under working conditions, due to the continued presence of nascent hydrogen while castings are in contact with the acid, which also releases arsenic from the dissolved trichloride to form arsine gas. He considers that a point of equilibrium is also reached in the case of zinc in the galvanizing pot. Analysis seemed to indicate that equilibrium had been reached in the samples examined, and that variations in the arsenic content of material in the pot would depend upon the amount of free hydrochloric acid on castings at the time of galvanizing, this producing more or less nascent hydrogen for the release of arsenic from both the casting and zinc in the pot. The nascent hydrogen would have affinity for any arsenic in contact with it.

Zinc pigs which were examined contained no trace of arsenic but the sample removed from the galvanizing pot was found to contain 0.05 per cent arsenic trioxide. A certain amount of arsenic trichloride probably adheres to the casting when removed from the muriatic acid vat and the acid still clings to the casting when it is placed in the sal ammoniac flux.

Sal ammoniac, as delivered to the galvanizing shop, was found to contain no trace of arsenic. That which had been used for some time contained 0.0001 per cent of arsenic trioxide. The principal source was considered to be arseniuretted hydrogen which had slowly oxidized to arsenic trioxide on the walls and had then settled with dust upon the sal ammoniac.

It would appear that the small amount of arsenic introduced into the muriatic acid bath by fresh acid was of minor importance in view of the increasing concentration of arsenic in the vat during use and the fact that the danger seemed to be due principally to impurities of the metals undergoing the galvanizing process. The question can not be settled here, whether this view fully accounts for the two cases of poisoning, one of them fatal, although apparently similar conditions had obtained for many years, respecting ventilation, muriatic acid, and other materials without ill effect upon any employee.

In a letter commenting on the practicability of using gas masks with suitable canisters for protection against arseniuretted hydrogen, Commander E. W. Brown, Medical Corps, United States Navy, Chief of the Biochemical Department, Medical Research Division of the Chemical Warfare Service, Edgewood Arsenal, stated that arsenic is a contamination of hydrochloric acid on the Pacific coast for the reason that sulphuric acid used in its preparation is in turn manufactured from sulphur dioxide from smelting operations. He observed that in the East, where sulphuric acid is made from pure sulphur, arsenic is not an impurity in hydrochloric acid, and a priori one would not expect to find reports of arsenical poisoning from galvanizing operations in this section of the country, but the building up of the arsenic content in the muriatic acid bath with arsenic from castings, puts another light on the matter.

According to Kober and Hayhurst, "Industrial Health," galvanizing is a process where cases of arseniuretted hydrogen poisoning might be expected in view of the quantities of commercial hydrochloric acid and zinc and iron used. Reported cases, however, are few. They were apparently able to refer to only seven cases connected with galvanizing works. In these, there were indefinite symptoms of headache, giddiness, weakness of the limbs, and tremor. Jaundice and hematuria were symptoms in some of the cases. Other patients showed keratosis of the skin on the hands, resembling the condition seen in poisoning from arsenic in beer. The only men attacked were those engaged in dipping iron sheets in the acid solution. The amount of arsenic in the acid used was stated to have been 0.035 per cent, which was considered a rather small amount to account for the cases.

It is considered advisable to publish all ascertainable details concerning the two cases that occurred at the navy yard, Puget Sound, Wash., because of the rarity of poisoning in galvanizing shops, in spite of the fact that arsenic is probably present, very often in considerable amounts.

In the opinion of the officers who investigated the matter, contributory factors increasing the danger of poisoning were an unusual press of work leading the employees who were affected to expose themselves to the fumes longer than was safe during a period of foul weather existing at the time which may have made the ventilation worse than usual. It was also considered probable that the materials processed during that period contained an extraordinary amount of arsenical impurities. Other employees stated that the fumes were more irritating than any they had previously experienced, and this they attributed to some quality of the last batch of sulphuric acid used. Chemical analysis of the acid, however, failed

to support that view. One man, who had worked in the shop for several years, was not affected although he was engaged in the same class of work and worked alongside the men who were poisoned, but not always in the same shift. Part of the time he and the man who died were working on an early morning shift, sometimes beginning at 2 a. m. and sometimes at 4 a. m. The second man poisoned worked at all times in the day shift. All three were probably equally exposed to high concentrations of the fumes, more so than men working at the galvanizing pot, because they were directly employed at pickling tanks, cleaning material, removing articles from tanks and transferring them in regular order to the galvanizing pot. They also handled the sal ammoniac, covering clean work.

The master mechanic in charge of the shop thought new men were not so likely to take good care of themselves as experienced galvanizers. Such opinions, of course, are usually expressed by employees under such circumstances. New men were not instructed as to possible dangers of the fumes. During his 25 years' experience as a galvanizer no case of injury or serious illness resulting from the inhalation of fumes had come to his attention either by observation or reading until the two men were affected in this instance. He had never heard that the muriatic-acid both might become dangerous. In view of precautions already taken as a result of the poisoning, he had no suggestions to make regarding additional preventive measures, and he thought working conditions would be safe with the additional mechanical ventilation already provided.

It appears that the sulphuric-acid tank was cleaned about three days before the first man poisoned was taken sick. In the opinion of the employee who was not poisoned although he worked over that bath as well as the muriatic-acid vat, the fumes arising from the new bath were different from any previously experienced. He noticed a change in the odor as soon as the new acid was put into use, and he said he spoke about it in the shop but did not report it in the office. He considered that the fumes were stronger and "cut in more" and had an odor like that of vinegar but not like garlic. He said he had to go out about every 20 minutes for fresh air and he had never had to do that before. His observations indicate that it was more trying to work in the fumes than ever before in his experience but it is not clear that cleaning the sulphuric-acid vat and renewing the acid was responsible. Nevertheless, since correlation existed between the introduction of fresh sulphuric acid and poisoning by arsine which was presumably evolved from the muriatic-acid tank, it may be well to mention the facts. Connection, if it existed between the two happenings, was not traced.

It was brought out in the investigation that ventilation was better in the vicinity of the galvanizing pot. That tended to minimize the

danger of poisoning for men working there, and proportionately less arsine was generated there. Arsine gas is about two and seven-tenths times the weight of air. The ventilators in the roof therefore probably did not remove very much of the gas, which tended to sink and finally escape through doors close to the ground. Under the conditions it was thought the arsine hovered near the floor, especially in the vicinity of the muriatic-acid vat, for a considerable time before leaving the building.

Prompt action was taken at the navy yard to improve ventilation in the shop. A blower having capacity to exhaust 15,000 cubic feet of air per minute was installed with a system of ducts leading from tanks. Existing ventilation shafts were also enlarged. There was already one outlet through the roof directly over the galvanizing pot and one directly over the muriatic-acid tank. For several months a blower had been operating to increase the flow of air through the latter, but without improving the ventilation in the shop to a noticeable degree. After poisoning occurred, another large natural outlet shaft was installed in the northwest corner of the shop and a similar shaft was built over the sulphuric-acid tank.

With improved ventilation it seemed unlikely that deposits of arsenic trioxide would form on the walls. The best method of removing such deposits was considered washing down with water to avoid making dust, as would occur if they were brushed down. The deposits were looked upon as a distinct menace to health in themselves.

The practice was begun of analyzing samples from the muriatic-acid bath every week to detect increasing concentration of arsenic trichloride. Orders were also issued requiring weekly physical examination of men working in the galvanizing shop. Samples of urine submitted by the four shop employees who were not poisoned contained arsenic in terms of arsenic trioxide in the following percentages: 0.000025, 0.00001, 0.000001, and 0.000001.

The principal preventive measure indicated was doubtless improved ventilation. Good ventilation would appear to be necessary for safety under any conditions where galvanizing operations are conducted. It was considered that a separate building with large doors on all four sides would be preferable, but that workmen would probably be safe in the shop as now located and ventilated. As pointed out by Capt. J. A. Murphy, Medical Corps, United States Navy, senior medical officer of the yard, the ideal plan would be to arrange the several tanks in proper sequence, provide apparatus for lifting and transferring castings, and install exhaust ventilation ducts near the surface level of tanks in such manner that the workmen would always be to windward of the fumes.

The practicability of furnishing protection by gas masks for those who must breathe fumes containing arseniuretted hydrogen should be mentioned. Commander E. W. Brown, Medical Corps, United States Navy, writing from Edgewood Arsenal, states that gas masks of the present standard Army type will protect against high concentrations of arsine when equipped with canisters containing Whetlerite. That material is coconut charcoal which has been impregnated with copper oxide at high temperature. It acts as a catalyst, is stable on storage, and has a very high absorbent capacity for arseniuretted hydrogen. It is difficult to induce workmen to wear masks.

With regard to the men who were poisoned, the first intimation that anyone had been made ill was received when a local physician telephoned the senior medical officer that an employee who had worked in the galvanizing plant was ill. He requested that a medical officer be sent to visit the man with him. The patient was in a stupor when seen. The stupor gradually deepened into coma, which prevailed until death, four days later. There was anuria during the whole period of observation. Acute nephritis was intense. A few small specimens of urine were obtained by catheter—about 15 cubic centimeters in all. These showed a large amount of albumin and blood.

The blood showed marked nitrogen retention. There was severe anemia with hemoglobin less than 40 per cent and a red-cell count of about 1,000,000.

There was brownish pigmentation of the skin.

At postmortem examination the kidneys were found enlarged, soft, and deep red in color. The capsule stripped more readily than usual, leaving a soft, friable cortex, which cut with decreased resistance. The cut surface was dark red with darker, almost brown, discoloration of papillae. The cortex was of normal width but the markings were obscure.

The liver, which was enlarged, weighed 1,900 grams. The cut section was lighter in color than normal.

The lungs showed profuse edema. There was some active congestion in one of the lower lobes but no consolidation. The heart was normal except for flabbiness and paleness of the myocardium.

The mucous membrane of the stomach and intestines showed brownish pigmentation. Examination of other organs, including the brain, was negative.

The pathological picture was that of acute nephritis, caused by metallic poisoning. The organs were examined by the navy yard chemist and reported negative for arsenic.

The patient's wife stated he had complained every night of the fumes before he was taken sick.

The second case was seen on the first day of illness. The man was suddenly seized with vomiting and pain in the abdomen. About 8 hours later he passed bloody urine. He was somewhat drowsy, but it could not be said that he was in a stupor. At that time he had no pain. The only physical finding was dark color of the skin. He had become almost the color of a Filipino. Later some tenderness developed in the region of his stomach and gall bladder.

The urine, which had the color of port wine, contained a large amount of albumin and many casts. After 24 hours the urine gradually cleared, and attained normal color on the fourth day of illness, but still contained a large amount of albumin and casts.

The blood showed considerable nitrogen retention in evidence of nephritis. There was anemia due to destruction of blood. The red-cell count was 2,500,000 and the hemoglobin 70 per cent.

The patient gradually recovered.

The clinical findings were reported by Lieut. Commander E. G. Hakansson, Medical Corps, United States Navy.

NOTE.—The sanitary report for the month of March, forwarded April 6, 1927, by the senior medical officer of the navy yard, indicates that a classified laborer employed in the galvanizing shop was poisoned by arseniuretted hydrogen in March, but was convalescing when the report was written and was expected to return to work. The medical officer stated that old ground containing arsenic had been removed and the additional ventilation apparatus mentioned above for removing the heavy gas fumes was being installed, the relative positions of tanks remaining the same.

In view of the fact that the shop was successfully operated for many years without the additional ventilation provided before the occurrence of a third case of poisoning about two months after the second, some other factor besides the lack of mechanical ventilation, not yet clearly appreciated, may have been chiefly responsible for the development of all three cases.

**DATA USEFUL IN ESTIMATING THE AMOUNT OF FOOD WASTED BY MEN
EATING IN HOSPITAL WARDS AND IN A GENERAL MESS**

Those who have studied ration problems realize the need of more accurate information than that hitherto available regarding food wasted at the table. Table waste amounts to no small percentage of total waste, and, with special reference to utilizable fuel value, all forms of waste, avoidable and unavoidable, contribute to increase the cost per calorie of food consumed, regardless of whether the loss is due to spoilage, damage, cooking, or waste after the food is served.

Loss from spoilage can be estimated quite accurately with proper bookkeeping, while the number of calories contained in food served but not eaten is difficult to estimate. Such waste is also influenced by variable factors. Useful data bearing upon the allowance that should ordinarily be made for food left on plates can only be obtained by accurate weighing of foods served and of foods left uneaten under representative conditions with careful study of the various factors that must be taken into consideration.

With the need for such information in mind, while making recent studies of the ration as issued on board certain ships, it was very gratifying to note from the last annual sanitary report for the United States Naval Hospital, Norfolk, Va., that the commanding officer, Capt. R. C. Holcomb, Medical Corps United States Navy, had become interested in that phase of the food question, and the commissary officer had undertaken the task of estimating the amounts of foods wasted by men eating in the mess hall and by patients eating in the hospital wards.

During the months of October and December, 1926, food left on plates in the general mess hall and in the wards was collected and weighed after each meal. While it was felt that the studies had not been carried far enough to warrant very definite conclusions, the data already collected were included in the report and it was purposed to continue the investigation, primarily with the object, which led to the undertaking in the beginning, of reducing avoidable waste as much as possible with a view to reducing the cost of food while improving the quality of the ration.

It had already been noted in the hospital that the enlisted men did not eat freely of the protective foods such as celery, lettuce, spinach, kale, cauliflower, turnips, carrots, parsnips, beets, and cabbage. When these foods are served, even in comparatively small amounts, they contribute to increase the waste of food. It does not pay to disregard the likes and dislikes of the men, and by studying them much information of practical value can be obtained which will aid the commissary officer in preparing menus and in eliminating expensive foods that are not acceptable. The information is also useful in dealing with the cooks. A good cook does not like to be told that 10 men out of 20 did not eat his soup; that 6 out of 20 left his boiled kale; or that 9 out of 20 refused his buttered parsnips. When the cook knows that the acceptability of the food prepared by him is being checked, he feels that his work is being inspected, and very likely he will feel the urge to prepare the rejected items in a more acceptable way the next time. A check on the amounts of the different items consumed per man also serves as a guide in issuing food at

the serving tables. If experience shows that only a small amount of a particular item is consumed, instructions are issued to serve smaller portions. When it is found that portions of a certain item are entirely eaten, instructions are given to make a slight increase. In general, men do not like to return to the serving table for a second helping. In order to reduce waste and at the same time avoid discontentment, it is important to make the original serving exactly what the individual will consume.

An educational campaign is being conducted to induce men to eat more of the protective vegetables by telling them of their special virtues. It is planned to place a blackboard just outside the entrance to the mess hall and write the menu for each meal upon it with suitable comment on each item of food. Experience has shown that the men will not return to the serving table for a second helping of a single item. If they do not receive as much food as they want on the first helping, they will either leave the mess hall and complain that they did not get enough to eat or they will fall in line for a complete tray of everything. If they take a complete tray, much of the food on that tray will be wasted. That is certainly undesirable, and it is not right that they should leave the mess hall dissatisfied. The reason they will not go back to the serving table for a second helping appears to be that they feel they will be holding back their shipmates who have been waiting in line to be served. The ideal practice is to give each man exactly what he will eat at the original serving.

The studies which are being made of food wasted will help the commissary officer in this direction, but the solution of the problem is difficult with a constantly changing personnel consisting of both healthy men and convalescent patients.

In collecting waste for weighing, liquids are excluded as much as possible, but under rush working conditions it is very difficult to prevent some liquids from getting into the solid foods. Therefore the figures presented are not absolutely accurate. Another factor that introduces an element of error is that in the hurried scraping of dishes some food is left on the dishes and passes out unweighed through the dish-washing machine.

The following summary was presented in the annual sanitary report:

Daily average weight of food wasted per person served in the mess hall

	Breakfast	Dinner	Supper	Total
	<i>Ounces</i>	<i>Ounces</i>	<i>Ounces</i>	<i>Ounces</i>
December, 1926.....	3.21	4.56	2.5	10.27
October, 1926.....	2.5	3.63	2.16	8.29

Daily average weight of food wasted per patient fed in hospital wards

	Breakfast	Dinner	Supper	Total
	<i>Ounces</i>	<i>Ounces</i>	<i>Ounces</i>	<i>Ounces</i>
December, 1926.....	6.53	8.67	6.90	22.10
October, 1926.....	6.45	9.17	7.39	23.01

In order to estimate what percentage of food served was discarded as waste, a survey was made on three separate days in December. The weight of food placed on an average tray was determined and the food left on each tray included in the survey was also weighed. Coffee was not weighed, but soup was. The following figures were obtained:

	Weight of food on the average tray	Weight of food left on the average tray	Per cent wasted
	<i>Ounces</i>	<i>Ounces</i>	
Dec. 20:			
Dinner.....	32	4.2	13
Supper.....	16	3.5	22
Dec. 21:			
Breakfast.....	21	3.5	17
Dinner.....	28	4.1	14
Supper.....	24	3.0	12
Dec. 22:			
Breakfast.....	16	1.5	9
Dinner.....	40	4.0	10

Further observations were made in January, February, and March, 1927, with the following results:

Comparison of mess hall food waste with the amount of prepared food served. An average tray of food as served was weighed at each meal. The weight of coffee, cocoa, and tea was not included. The weight of soup was included

	Weight of food on the average tray	Average weight of waste from all trays	Per cent wasted
	<i>Ounces</i>	<i>Ounces</i>	
Jan. 17: Supper.....	17	3.2	19
Jan. 18: Supper.....	13	2.2	17
Jan. 19:			
Breakfast.....	9	1.9	21
Supper.....	19	4.0	21
Jan. 20:			
Breakfast.....	15	3.8	25
Supper.....	17	2.5	15
Jan. 21:			
Breakfast.....	14	3.4	24
Dinner.....	38	5.7	15
Supper.....	15	4.5	30
Jan. 22:			
Breakfast.....	12	2.3	19
Dinner.....	32	5.5	17
Supper.....	24	1.8	8
Jan. 23:			
Breakfast.....	20	4.5	2
Dinner.....	28	5.0	1
Supper.....	24	4.3	1

*Comparison of mess hall food waste with the amount of prepared food served,
etc.—Continued*

	Weight of food on the average tray	Average weight of waste from all trays	Per cent wasted
Jan. 24:	Ounces	Ounces	
Breakfast.....	18	3.7	21
Dinner.....	23	3.1	14
Supper.....	18	3.1	17
Jan. 25:			
Breakfast.....	14	1.5	11
Dinner.....	29	3.1	11
Supper.....	24	3.6	15
Jan. 26:			
Breakfast.....	19	2.0	11
Dinner.....	22	4.5	20
Supper.....	18	2.6	15

Waste collected from trays during the month of February, 1927

WARDS

Date	Number served at each meal	Breakfast		Dinner		Supper	
		Pounds waste	Ounces per man served	Pounds waste	Ounces per man served	Pounds waste	Ounces per man served
1.....	177	70	6.3	56	5.1	35	3.2
2.....	163	60	5.9	75	7.4	51	5.0
3.....	181	75	6.7	84	7.4	67	5.9
4.....	177	61	5.5	103	9.3	51	4.6
5.....	186	66	5.7	76	6.5	41	3.5
6.....	182	87	7.7	130	11.4	75	6.6
7.....	182	56	4.9	106	9.3	27	2.4
8.....	180	114	10.1	94	8.4	70	6.2
9.....	177	54	4.9	53	4.8	50	4.5
10.....	174	62	5.7	57	5.2	65	6.0
11.....	181	60	5.3	73	6.5	55	4.9
12.....	177	110	9.9	99	8.9	30	2.7
13.....	177	81	7.3	111	10.0	55	5.0
14.....	182	65	5.7	70	6.2	55	4.7
15.....	182	70	6.2	56	4.9	54	4.7
16.....	181	75	6.7	76	6.7	47	4.2
17.....	182	48	4.2	65	5.7	34	3.0
18.....	174	78	6.1	57	5.2	57	5.2
19.....	174	74	6.8	45	4.1	37	3.4
20.....	172	65	6.0	92	8.5	47	4.4
21.....	172	70	6.5	54	4.4	30	2.8
22.....	177	100	9.0	115	10.4	47	4.2
23.....	174	58	5.3	50	4.6	65	6.0
24.....	176	44	4.0	45	4.1	48	4.4
25.....	174	70	6.4	70	6.4	81	7.4
26.....	165	85	8.2	118	11.4	62	6.0
27.....	162	57	5.7	80	7.9	35	3.5
28.....	170	75	7.1	57	5.4	40	3.8
Total.....	4,931	1,990	178.8	2,167	196.1	1,411	128.2

Waste collected from trays during the month of February, 1927—Continued

MESS HALL

Date	Number served at each meal	Breakfast		Dinner		Supper	
		Pounds waste	Ounces per man served	Pounds waste	Ounces per man served	Pounds waste	Ounces per man served
1.....	606	86	2.3	154	4.0	63	1.7
2.....	613	90	2.3	115	3.0	78	2.0
3.....	584	63	1.7	176	4.8	71	1.9
4.....	624	187	4.8	183	4.7	96	2.4
5.....	600	91	2.4	191	5.1	76	2.0
6.....	577	151	4.2	181	5.0	110	3.1
7.....	600	107	2.8	152	4.1	72	1.9
8.....	620	227	5.9	206	5.3	119	3.1
9.....	619	37	1.0	112	2.9	84	2.2
10.....	624	107	2.7	194	5.0	100	2.6
11.....	609	112	2.9	161	4.2	110	2.9
12.....	599	77	2.5	192	5.1	46	1.2
13.....	616	205	5.3	217	5.6	82	2.1
14.....	632	125	3.3	190	4.8	73	1.8
15.....	608	96	2.3	206	5.4	101	2.7
16.....	606	104	2.7	276	7.3	71	1.9
17.....	599	92	2.5	181	4.8	85	2.3
18.....	630	106	2.7	329	8.4	87	2.2
19.....	631	122	3.1	105	2.7	79	2.0
20.....	605	150	4.0	259	6.8	68	1.8
21.....	636	95	2.5	132	3.3	65	1.6
22.....	613	310	8.1	284	7.4	108	2.8
23.....	660	77	1.9	132	3.2	87	2.1
24.....	645	207	5.1	193	4.8	153	3.8
25.....	675	116	2.7	200	4.7	120	2.8
26.....	657	117	2.8	204	5.0	85	2.1
27.....	663	144	3.5	212	5.1	42	1.0
28.....	675	136	3.2	151	3.6	60	1.4
Total.....	17,426	3,537	91.1	5,288	136.1	2,391	61.4

The following data were collected regarding individual items of the menus. Except where otherwise stated, 20 trays were examined at each meal:

Mess hall food waste survey

	Ate all served	Ate part	Ate none
Dinner, Feb. 8, 1927 (Tuesday):			
Navy bean soup.....	18	0	2
Pork chops, gravy.....	20	0	0
Boiled kale.....	13	1	6
Coleslaw.....	13	3	4
Brown betty, lemon sauce.....	20	0	0
Bread.....	18	2	0
Butter.....	19	1	0
Coffee.....	19	1	0

(5.3 ounces of waste per tray.)

Comment.—Most of these trays were taken from patients. The usual per cent of kale was left over. Navy bean soup consumed as usual. The usual per cent of coleslaw (cabbage) refused. The men like pork chops, while the officers do not like them so well.

Mess hall food waste survey—Continued

	Ate all served	Ate part	Ate none
Supper, Feb. 8, 1927 (Tuesday):			
Corned beef hash.....	18	1	1
Boiled rice.....	17	1	2
Cauliflower.....	13	4	3
Banana fritters.....	20	0	0
Oranges.....	19	0	1
Bread.....	19	1	0
Butter.....	20	0	0
Coffee.....	15	5	0

(3.1 ounces of waste per tray.)

Comment.—Many of the men do not like cauliflower.

	Ate all served	Ate part	Ate none
Dinner, Feb. 9, 1927 (Wednesday):			
Rice tomato soup.....	14	4	2
Chicken in casserole with baking-powder biscuits.....	18	2	0
Mashed potatoes.....	17	1	2
Creamed carrots and peas.....	16	0	4
Celery stalks.....	13	4	3
Ice cream.....	20	0	0
Bread.....	14	4	2
Butter.....	17	1	2
Coffee.....	11	8	1

(2.9 ounces of waste per tray.)

Comment.—The soup was good. Usual amount of carrots left over. Usual amount of celery left over. More waste on bread because one biscuit was served with chicken.

	Ate all served	Ate part	Ate none
Dinner, Feb. 11, 1927 (Friday):			
Vegetable soup.....	14	2	4
Flounders, fried.....	15	4	1
Escalloped potatoes.....	17	2	1
Stewed tomatoes.....	15	2	3
Pickled beets.....	14	3	3
Minced meat pie.....	20	0	0
Graham bread.....	19	1	0
Butter.....	20	0	0
Coffee.....	13	7	0

(4.2 ounces of waste per tray.)

Comment.—Most of these trays from convalescent patients. The usual amount of beets left over.

	Ate all served	Ate part	Ate none
Dinner, Feb. 12, 1927 (Saturday):			
Left-over soup.....	14	5	1
Pot roast of beef, gravy.....	18	2	0
Candied sweet potatoes.....	19	1	0
Boiled kale.....	18	0	2
Buttered parsnips.....	10	5	5
Mountain dew pudding.....	20	0	0
Bread.....	18	2	0
Butter.....	20	0	0
Coffee.....	10	10	0

(5.1 ounces of waste per tray.)

Comment.—In this case it is believed that the figures on kale are misleading because some might not have taken kale at the serving table. The usual amount of parsnips refused. The soup was fair.

Mess hall food waste survey—Continued

	Ate all served	Ate part	Ate none
Dinner, Feb. 14, 1927 (Monday):			
Spaghetti soup.....	15	2	3
Breaded veal cutlets.....	18	2	0
Potato puff.....	18	2	0
Creamed carrots and peas.....	16	2	2
Celery stalks.....	13	2	5
Baked apple.....	20	0	0
Bread.....	20	0	0
Butter.....	20	0	0
Coffee.....	12	8	0

(4.8 ounces of waste per tray.)

Comment.—None.

	Ate all served	Ate part	Ate none
Dinner, Feb. 17, 1927 (Thursday):			
Chicken rice soup.....	16	3	1
Pot roast beef, gravy.....	17	3	0
Mashed potatoes.....	18	2	0
Kale.....	15	1	4
Succotash.....	17	1	0
Lemon meringue pie.....	20	0	0
Bread.....	19	1	2
Butter.....	20	0	0
Coffee.....	12	8	0

(4.8 ounces of waste per tray.)

Comment.—None.

	Ate all served	Ate part	Ate none
Dinner, Feb. 15, 1927 (Tuesday):			
Navy bean soup.....	18	2	0
Baked spiced ham, gravy.....	17	3	0
Sweet-potato puff.....	18	0	2
Spinach, bacon.....	16	2	2
Stewed tomatoes.....	17	3	0
Graham bread.....	17	3	0
Butter.....	17	1	2
Coffee.....	12	4	4
Pumpkin pie.....	18	2	0

(5.4 ounces of waste per tray.)

Comment.—Spinach was prepared better to-day by using bacon with it. They ate it better. Navy bean soup is well liked. Ham is well liked.

	Ate all served	Ate part	Ate none
Dinner, Feb. 16, 1927 (Wednesday):			
Clear beef soup.....	14	4	2
Chicken pie.....	20	0	0
Mashed potatoes.....	18	1	1
Devil corn.....	16	2	2
Creamed peas.....	15	0	5
Celery stalks.....	11	4	5
Ice cream.....	20	0	0
Bread.....	17	3	0
Butter.....	20	0	0
Coffee.....	12	8	0

(7.3 ounces of waste per tray.)

Comment.—Most of the waste on this meal was left by convalescent patients. The Hospital Corps men attached to the Hospital Corps School clean up their plates.

Mess hall food waste survey—Continued

	Ate all served	Ate part	Ate none
Supper, Feb. 23, 1927 (Wednesday):			
Baked fresh meat hash.....	13	4	3
German fried potatoes.....	16	4	0
Beet onion salad.....	18	2	0
Congo pie.....	20	0	0
Bread.....	18	2	0
Butter.....	20	0	0
Coffee.....	19	1	0

(2.1 ounces of waste per tray.)

Comment.—None.

	Ate all served	Ate part	Ate none
Dinner, Feb. 26, 1927 (Saturday):			
Vegetable soup.....	16	2	2
Roast leg of lamb.....	20	0	0
Mashed potatoes.....	16	2	2
Mashed turnips.....	12	6	2
Cabbage, parsley, green pepper salad.....	14	6	0
Apple dumplings, custard sauce.....	20	0	0
Rolls.....	20	0	0
Butter.....	20	0	0
Coffee.....	20	0	0

(5 ounces of waste per tray.)

Comment.—The lamb was well cooked and they ate it well. Most people will say that men in the Navy do not like lamb or mutton, but experience at this hospital shows that if it is well cooked they eat it as well as, if not better than, other meat.

	Ate all served	Ate part	Ate none	Took none
Dinner, Mar. 9, 1927 (Wednesday):				
Chicken rice soup.....	7	0	1	18
Roast veal, gravy.....	19	2	5	0
Mashed potatoes.....	20	2	4	0
Green peas, housekeepers' style.....	17	2	7	0
Lettuce salad, French dressing.....	17	0	9	0
Congo pie.....	25	0	1	0
Bread.....	19	4	3	0
Butter.....	19	0	7	0
Coffee.....	20	6	0	0

(26 trays examined in wards 6 and 8.)

Comment.—Note that only a few of the ward patients took soup. Much more butter is wasted in the wards than in the mess hall.

	Ate all served	Ate part	Ate none	Took none
Dinner, Mar. 10, 1927 (Thursday):				
Lima bean soup.....	10	0	1	12
Pot roast of beef, gravy.....	18	2	3	0
Richmond corn cakes.....	20	1	2	0
Duchess potatoes.....	11	0	12	0
Boiled cabbage.....	14	0	9	0
Bread-custard pudding.....	18	2	3	0
Bread.....	16	6	1	0
Butter.....	18	0	5	0
Coffee.....	18	5	0	0

(23 trays examined at this meal.)

Comment.—Only half the men took soup. Not many ate the potatoes because they were prepared in a new way to which they are not accustomed.

AN OUTBREAK OF FOOD POISONING AT UNITED STATES NAVAL TRAINING STATION, HAMPTON ROADS, VA., ATTRIBUTED TO CANNED VIENNA SAUSAGES

An outbreak consisting of 101 observed cases of food poisoning occurred at the training station, Hampton Roads, Va., March 17, 1927. The suspected food was canned Vienna sausage served at breakfast to about 3,300 men. First indications of illness—nausea and cramps—appeared from three to four hours after the food was eaten.

Breakfast consisted of oranges, eggs a la Espagnole, Vienna sausage, potatoes Delmonico, coffee, bread, and butter. The foods served at supper the previous evening were curry of beef, carrot loaf, stewed potatoes, cabbage salad, peach cobbler, tea, bread, and butter.

No bacteriological examination was made and the evidence studied was only suggestive. Therefore record can only be made here of the fact that canned Vienna sausages were incriminated and indeed appeared to be the only food that could be held responsible.

Each can contained 32 sausages. The cans were opened and the sausages were steamed without removing them. They were then served directly from the cans at the various mess tables.

It was considered from the number of men poisoned that four or five cans must have been contaminated. It appears that the commissary department was undermanned and the facilities of the galley overtaxed, so the cans were not opened under the immediate supervision of a person qualified by experience to detect any unfit for use. Certain outbreaks of food poisoning previously reported in the BULLETIN suggest that the probability that an outbreak will occur in an organization is quite definitely increased by overcrowding or by an insufficiency of the culinary force resulting from any cause. The great danger under such circumstances is that the food will be exposed to contamination by carriers or by vermin locally. That seems not to have occurred in this instance, but inasmuch as the report did not mention the manner in which the 101 cases were distributed among the 3,300 men who ate breakfast, or definitely state that none of the men with symptoms of poisoning had refrained from eating sausage, conclusions can not be drawn with certainty.

If four or five among the many cans opened for the breakfast in question contained the same toxin or poison, it would seem almost necessary to assume that those cans were improperly processed and that toxin producing microorganisms survived the degree of heat applied. If that happened, the chances are that the defective cans belonged to one lot. The evidence submitted was not complete enough, however, to warrant definite conclusions regarding these points.

The symptoms of the men affected were those which have been repeatedly described as occurring in food poisoning caused by a member of the *B. enteritidis-paratyphoid* group. Vomiting and diarrhea occurred and considerable prostration was noted in some cases. All patients recovered and all were fit for duty in less than 48 hours. Chilliness and frontal headache were experienced by most of the patients, and most of them complained of severe continuous abdominal cramps. The men most severely attacked had fever up to 101° F.

EPIDEMIC OF INFLUENZA AMONG NATIVES OF SAMOA IN AUGUST, 1926

American Samoa was not visited by an epidemic of influenza during the World War nor in any subsequent year until 1926 when the disease was introduced early in August. The first case of what proved to be an epidemic that spread rapidly through native villages developed August 12, 1926.

The virus was possibly transported from the Pacific coast of the United States, where, it will be recalled, epidemics began in January and reached their peaks in February and March. It seems unlikely that the infection was carried directly from the United States to Samoa. The senior medical officer of the United States naval station at Tutuila stated in his monthly sanitary report for August, 1926, that the disease was introduced August 10 from Apia where it had been imported from New Zealand on the 28th or 29th of July. He mentioned that epidemics were reported coincidentally not only in Western Samoa but in Tonga as well where influenza was considered to have been introduced by the same ship that carried the disease of Apia. The American consul at Apia, British Samoa, reported the beginning of a mild outbreak of highly communicable influenza August 15, 1926.

An epidemic strain of influenza virus may have been transported earlier from the United States to New Zealand, but, judging from European records, influenza was pandemic in 1926 as it was in 1917 and 1918.

According to the epidemiological summary of influenza in the early part of 1926, published in Public Health Reports, August 20 of that year by the office of statistical investigations, United States Public Health Service, in the group of 105 great towns of England and Wales, a very marked increase in influenza mortality appeared in March, reaching its peak in the week ending April 17. In Glasgow, Paris, Amsterdam, Stockholm, Milan, and in 46 German cities as a group, influenza was epidemic during February, March, and April.

So far as can be ascertained from reports received by the bureau of the United States Public Health Service, epidemics were not

occurring in Australia. The early months of the year were, of course, summer months in Australia.

Outbreaks of cerebrospinal meningitis were occurring in Japan and influenza was probably quite prevalent, but the records do not show that extensive epidemics of the latter occurred that year.

In the United States the epidemics of 1926 were similar to those of 1918 and 1920 in several respects. They were similar in general with regard to duration in that the various outbreaks in different population groups began and ended within a period of three months. There was similarity in the time required for epidemics to reach maximum mortality rates and also in the rates of mortality increase and decrease, but the rates of spread were somewhat slower for 1926 epidemics, and the incidence curves were more flattened out; sharp peaks were less evident, and these differences were associated with somewhat lower attack rates and less rapid spread through exposed population groups as a whole. While case fatality rates were not so high as in the autumn of 1918 and during the early months of 1919, the mortality statistics show that there was a large excess of deaths over the corresponding period of 1925, which was not an influenza year. As reported by the officer of statistical investigations, were it not for the overshadowing pandemic of 1918 which caused more than 500,000 deaths in the United States, and the 1920 epidemics which caused about 100,000 deaths, influenza in 1926 would have been regarded as a calamity.

The population of American Samoa in 1920 was 8,056, divided as follows:

	Male	Female
Polynesian.....	3,975	3,801
Mixed.....	127	106
White.....	31	10
All others.....	6	.....
Total.....	4,139	3,917

The number of cases of influenza on the island of Tutuila during the epidemic period was variously estimated as from 4,000 to 5,000. Besides native Samoans, 2 officers and 13 enlisted men of the United States Navy were attacked among 16 officers and 77 white enlisted men. Two of four Navy nurses contracted the disease.

The first person infected seems to have been a native who lived near the naval station. In spite of all possible precautions, the disease spread rapidly among the personnel of the station and was communicated to all parts of the island. That the disease was highly communicable is shown by the fact that every one of the 71 members of the native Fita Fita guard was attacked.

The epidemic lasted about one month. The peak was reached about August 24, or 12 days after the first case was discovered. The epidemic was rapidly subsiding September 10. After the epidemic period it was thought practically all natives had been attacked. There must have been many very mild cases. The schools, which had been closed since the beginning of the outbreak, were reopened September 13, and all other quarantine measures were discontinued except that certain restrictions were imposed on all children under 16 years of age, with a view to limiting the spread of measles and cerebrospinal fever, outbreaks of which began during the declining stage of the influenza epidemic.

There were four deaths from influenzal pneumonia among natives admitted to the Samoan hospital. There were possibly other fatal cases, but if so they were not discovered. It is not likely that all deaths are reported in the island. In general, the disease was regarded as a mild type of influenza, running its course in five to seven days, with fever for three or four days. Patients were usually discharged from treatment two days after the temperature reached normal.

No observations regarding differences in susceptibility as between the sexes or among the various age groups were reported.

The epidemiologist will be interested especially to know that influenza was not introduced into American Samoa during or after the World War. An epidemic was not experienced by the natives for many years prior to August, 1926. Reports are not at hand to show whether influenza was observed on the island during or after the 1889-90 pandemic. During the whole time that epidemics raged throughout the world, Tutuila was in regular steamship communication with San Francisco, Honolulu, Sydney, and other infected ports. Rigid quarantine was practiced and all loading and discharging of vessels was carried out under close supervision. In western Samoa, which is within sight of American Samoa, it was said that 19 per cent of the total population died as a result of the 1918-19 pandemic. Other instances have, of course, been cited where island population groups have been protected from influenza with quarantine methods. For example, the disease was kept out of the naval training station, San Francisco, Calif., which was located on Goat Island in 1918, while the initial severe epidemic was prevailing in the city and in all other naval organizations on the west coast. After the San Francisco epidemic was over, quarantine was raised, and when the city was visited by a recurrent epidemic many weeks later an outbreak also occurred on Goat Island, but, although most of the personnel was exposed for the first time, the epidemic in its principal features, attack rate, case fatality rate, and clinical characteristics,

was comparable not to the primary but to the secondary epidemic in the civilian community.

It is interesting to note here that among the Samoans, with presumably little mass immunity to check its spread and prevent whatever increase in severity attends rapid passage of the influenza virus among persons never previously infected, the disease behaved like influenza in other parts of the world in 1926, except for a much greater attack rate and short epidemic period as was to be expected with a highly susceptible population.

As also might be expected under these circumstances, very short incubation periods were observed. In some cases, it was thought, clinical manifestations began 12 hours after exposure.

An attempt was made to reduce the rate of spread by keeping natives in their own villages as much as possible and by prohibiting outsiders from entering villages. An order to that effect was executed by the governor two days after the epidemic began. In view of the history of influenza, it would have been surprising if any apparent limiting effect had been attributed to the measures adopted. All public gatherings were prohibited. The action taken was conventional.

Proscription of public assemblages and attempts to limit contact by imposing restrictions on the movements of persons, however, have probably never had any considerable effect in preventing influenza from spreading. In cold weather the avoidance of overcrowding indoors is probably important especially for limiting the transfer of pneumococci, streptococci, and other microorganisms which may be dangerous secondary invaders. There is little reason to believe that such measures have affected the influenza attack rate.

During an epidemic, if a susceptible person is prevented from being exposed on one day he will probably be exposed in some other place before many days have passed.

HEALTH OF THE NAVY

The general admission rate, all causes, based on returns for January, February, and March, 1927, was 678 per 1,000 per annum. The corresponding median rate for the first quarter of the year, derived from the records of the preceding five years, is 560. The excess was largely due to greater than usual winter prevalence of common infections of the respiratory type and to the appearance of influenza in epidemic form at the beginning of the year.

The admission rate from disease was 627 and the five-year median for the corresponding three months is 492. The admission rate from accidental injuries was 51 as compared with 63, the median or expected rate, representing experience in the preceding five years.

During the quarter, 2,912 cases notified as influenza and 2,743 as catarrhal fever were reported. Of the cases diagnosed as influenza, 1,199 occurred at the United States Naval Training Station, Hampton Roads, Va., an epidemic strain of influenza virus having been introduced from New York, as previously reported, by the destroyers, U. S. S. *Reuben James* and U. S. S. *Lawrence*, January 6. Health conditions on the training station at the time were unsatisfactory due to overcrowding as a result of sudden increases in the numbers of recruits received from day to day. The epidemic of influenza at that station continued for an unusual length of time, extending into April with 135 new cases that month. Seventy-six cases were also reported in May. As a rule, an epidemic of influenza at a naval station does not cover a period greater than two to four weeks.

Small outbreaks of influenza occurred in the navy yard, Washington, D. C., at marine barracks, Quantico, Va., and United States Naval Training Station, Great Lakes, Ill. Influenza was probably epidemic in Newport, R. I., as well as in other cities on Long Island Sound and Greater New York. At the naval training station, Newport, R. I., the peak in the incidence of respiratory diseases was reached in February. Reports from certain ships and from naval stations suggest that the disease was epidemic in the vicinity of Seattle, Wash., in Los Angeles, Calif., and San Diego, Calif. In the few naval organizations on the west coast which experienced outbreaks the disease reached its greatest prevalence early in February.

The following table shows the incidence of influenza and catarrhal fever by months at stations which reported considerable numbers of cases:

Station	Influenza				Catarrhal fever			
	January	February	March	Total	January	February	March	Total
Naval training station, Hampton Roads, Va.	418	509	272	1,199	142	155	78	375
Marine Barracks, Quantico, Va.	2	11	58	71	5	14	16	35
Marine barracks and navy yard, Washington, D. C.	0	79	16	85	0	6	0	6
Naval training station, Newport, R. I.	18	17	0	35	43	89	62	194
Naval training station, Great Lakes, Ill.	0	1	0	1	192	215	104	511
Naval training station, San Diego, Calif.	1	13	3	17	18	17	0	35

With the exception of a number of vessels belonging to the Scouting Fleet, which had outbreaks beginning early in January as a result of contact with New York City and near-by communities, few cases of influenza occurred during the winter among forces afloat. During the quarter ships reported influenza and catarrhal fever as follows:

Ship	Influenza	Catarrhal fever	Ship	Influenza	Catarrhal fever
U. S. S. Texas.....	89	0	U. S. S. Colorado.....	31	90
U. S. S. West Virginia.....	84	0	U. S. S. Coghlan.....	31	3
U. S. S. Camden.....	70	0	U. S. S. Richmond.....	30	9
U. S. S. Concord.....	65	1	U. S. S. Hopkins.....	24	0
U. S. S. Memphis.....	51	15	U. S. S. Tennessee.....	24	86
U. S. S. Antares.....	40	7	U. S. S. Henderson.....	14	11
U. S. S. Pennsylvania.....	39	0	U. S. S. John Francis Burnes.....	10	0
U. S. S. Dobbin.....	39	1	U. S. S. California.....	1	120
U. S. S. Medusa.....	38	0	U. S. S. Seattle.....	0	127
U. S. S. Omaha.....	35	1	U. S. S. Mississippi.....	0	81
U. S. S. Milwaukee.....	34	0	U. S. S. Maryland.....	0	76
U. S. S. Bridge.....	34	0			

So far as shore stations in the United States are concerned, altogether there would not have been much, if any, more sickness than usual during the winter months if it had not been for the excess at the naval training station, Hampton Roads, Va. There, as a result of the marked increase in the rate at which recruits were sent to the station, consequent overcrowding and interference in various ways with hygienic and sanitary conditions and the seeding of virulent influenza at or about the same time, it was not long before the epidemiological picture was very much like that seen at various stations during the World War. Up to the present time, of 21 deaths occurring in the Navy since January 1, chargeable to influenza, 13 resulted from infection developing at that training station. The case fatality rate there was about 1 per cent. The disease became intensely virulent among the susceptible recruits. In one case death occurred within a few hours after the initial symptom and in several during the first few days of illness. No death occurred among the 697 cases reported by the various ships listed in the table above.

As might have been expected and as the senior medical officer feared, other communicable diseases became epidemic at the naval training station, Hampton Roads, Va. The long-continued outbreak of scarlet fever which occurred was reported in detail in the last number of the BULLETIN with editorial comment. It is rather surprising that cerebrospinal fever did not develop. During the quarter 261 cases of mumps and 114 of measles were reported by the station.

All ships, naval stations, and expeditionary forces notified 22 cases of cerebrospinal fever. Four cases developed in January and two in March at United States Naval Training Station, San Diego, Calif., as a part of an outbreak which began at that station December 28, 1926. There were 13 cases at United States Naval Training Station, Great Lakes, Ill., during the quarter. One case occurred on board U. S. S. *New Mexico* and one on board U. S. S. *Oklahoma* early in February.

TABLE No. 1.—*Summary of morbidity in the United States Navy and Marine Corps for the quarter ended March 31, 1927*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	75, 508	38, 760	19, 471	114, 268
All causes:				
Number of admissions.....	9, 928	9, 443	3, 199	19, 371
Annual rate per 1,000.....	525.93	974.51	657.18	678.09
Disease only:				
Number of admissions.....	9, 067	8, 834	2, 941	17, 901
Annual rate per 1,000.....	480.32	911.66	604.18	626.63
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	4, 492	6, 541	1, 377	11, 033
Annual rate per 1,000.....	237.96	675.03	282.88	386.21
Venereal diseases:				
Number of admissions.....	2, 636	797	707	3, 433
Annual rate per 1,000.....	139.64	82.25	145.24	120.17
Injuries:				
Number of admissions.....	845	605	257	1, 450
Annual rate per 1,000.....	44.76	62.44	52.80	50.76
Poisoning:				
Number of admissions.....	16	4	1	20
Annual rate per 1,000.....	.85	.41	.21	.70

TABLE No. 2.—*Deaths reported, entire Navy, during the quarter ended March 31, 1927*

		Navy			Marine Corps		Nurse Corps	Total
		Officers	Midshipmen	Men	Officers	Men	Nurses	
Average strength.....		8, 451	1, 612	84, 282	1, 178	18, 261	484	114, 268
CAUSES: DISEASES								
Primary	Secondary or contributory							
Abscess, brain.....	Otitis, media, acute.....			1				1
Abscess, skin and cutaneous tissue.....	Septicemia.....			1				1
Alcoholism, acute.....	None.....			1				2
Do.....	Pneumonia, broncho.....				1			1
Do.....	Valvular heart disease, mitral insufficiency.....			1				1
Angina pectoris.....	Dilatation, cardiac, acute.....			1				1
Appendicitis, acute.....	Hepatitis, acute hemorrhagic.....					1		1
Do.....	Peritonitis, acute general.....					2		2
Arteriosclerosis, general.....	Thrombosis, coronary artery.....			1				1
Atrophy, liver, acute.....	None.....			1				1
Bronchitis, acute.....	Pneumonia, broncho.....			1				1
Calculus, urethra.....	Dilatation, stomach, acute.....	1						1
Cerebrospinal fever.....	None.....			6				6
Do.....	Pneumonia, broncho.....			1		1		2
Cholecystitis, chronic.....	Cholangitis, acute (post-operative shock).....			1				1
Dysentery, bacillary.....	None.....					1		1
Furunculosis.....	Pneumonia, lobar.....			1				1
Hemorrhage, cerebral.....	None.....			1				1
Hydronephrosis.....	None.....			1				1
Influenza.....	Pneumonia, broncho.....			10				10
Do.....	Pneumonia, lobar.....			2				2
Do.....	Endocarditis, acute ulcerative (malignant).....			1				1
Do.....	Encephalitis, lethargic.....			1				1
Do.....	Pneumonia, lobar, and pleurisy, suppurative.....			1				1
Do.....	Valvular heart disease, mitral stenosis and myocarditis, acute.....						1	1
Leukemia.....	None.....					1		1
Malaria.....	None.....			1				1
Measles.....	Pneumonia, broncho.....			1				1
Meningitis, cerebrospinal.....	None.....			1				1
Myocarditis, chronic.....	Thrombosis, cerebral.....	1						1

TABLE No. 2.—Deaths reported, entire Navy, during the quarter ended March 31, 1927—Continued

		Navy			Marine Corps		Nurse Corps	Total
		Officers	Midshipmen	Men	Officers	Men	Nurses	
CAUSES: DISEASES—continued								
Primary	Secondary or contributory							
Nephritis, acute.....	Psychosis, unclassified.....			1				1
Do.....	Valvular heart disease, mitral insufficiency.....					1		1
Nephritis, chronic.....	Dilatation, cardiac, acute.....			1				1
Pneumonia, broncho.....	None.....			1				1
Pneumonia, lobar.....	None.....			1		1		2
Do.....	Cellulitis, acute.....			1				1
Do.....	Pleurisy, acute suppurative.....			1				1
Do.....	Pleurisy, chronic fibrinous.....	1						1
Rabies.....	None.....			2				2
Septic sore throat.....	Septicemia.....			1				1
Tonsillitis, acute.....	Cellulitis, neck; edema, glottis.....					1		1
Do.....	Pneumonia, lobar, and pleurisy, suppurative.....			1				1
Tuberculosis, chronic pulmonary.....	None.....			5				5
Tuberculosis, acute general miliary.....	do.....			2				2
Tuberculosis, general miliary.....	do.....			1				1
Tuberculosis, intestines (perforated).....	Peritonitis, general, acute.....			1				1
Typhoid fever.....	None.....	1						1
Ulcer, duodenum, perforated.....	do.....	1						1
Ulcer, duodenum.....	Hemorrhage, duodenum.....					1		1
Carcinoma, right kidney.....	do.....	1						1
Carcinoma, squamous cell, left ankle.....	Mentastases, stomach and lung.....			1				1
Valvular heart disease, mitral insufficiency.....	None.....			1				1
		6		58		12	1	77
CAUSES: INJURIES AND POISONINGS								
Asphyxiation (illuminating gas).....	None.....			2		1		3
Burns, multiple.....	do.....			1				1
Fracture, compound, skull.....	do.....			1				1
Fracture, simple, skull.....	Hemorrhage, intracranial.....					1		1
Intracranial injury.....	None.....			2		1		3
Injuries, multiple, extreme.....		1		7				8
Rupture, liver, traumatic.....	Hemorrhage, liver, traumatic.....	1						1
Wound, penetrating, abdomen.....				1				1
Wound, penetrating, brain.....	None.....	2		1		1		4
Do.....	Psychosis, unclassified.....	1			1			2
Drowning.....				11		1		12
Total for injuries and poisonings.....		5		26	1	5		37
Grand total.....		11		84	1	17	1	114
Annual death rate per 1,000, all causes.....		5.21		3.99	3.40	3.72	8.26	3.99
Annual death rate per 1,000, disease only.....		2.84		2.76		2.63	8.26	2.70
Annual death rate per 1,000, drowning.....				.52		.22		.42
Annual death rate per 1,000, injuries.....		2.37		.71	3.40	.87		.87
Annual death rate per 1,000, poisonings.....								

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by naval training stations:

Cumulative data

	Number	Per cent of recruits received	Per cent of recruits reviewed
JAN. 1 TO DEC. 31, 1926			
All naval training stations:			
Recruits received during the period.....	16,212		
Recruits appearing before board of medical survey.....	842	5.19	
Recruits recommended for discharge from the service.....	496	3.06	58.91
JANUARY, FEBRUARY, MARCH, 1927			
U. S. Naval Training Station, Hampton Roads, Va.:			
Recruits received during the period.....	2,086		
Recruits appearing before board of medical survey.....	44	2.11	
Recruits recommended for discharge from the service.....	44	2.11	100.00
U. S. Naval Training Station, Great Lakes, Ill.:			
Recruits received during the period.....	2,550		
Recruits appearing before board of medical survey.....	58	2.27	
Recruits recommended for discharge from the service.....	45	1.76	77.59
U. S. Naval Training Station, San Diego, Calif.:			
Recruits received during the period.....	988		
Recruits appearing before board of medical survey.....	40	4.05	
Recruits recommended for discharge from the service.....	40	4.05	100.00
U. S. Naval Training Station, Newport, R. I.:			
Recruits received during the period.....	1,459		
Recruits appearing before board of medical survey.....	89	6.10	
Recruits recommended for discharge from the service.....	32	2.19	35.96

ADMISSIONS FOR INJURIES AND POISONING, FIRST QUARTER, 1927

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during the first quarter, 1927, is based upon all Form F cards covering admissions in those months which have reached the bureau:

	Admissions, January, February, and March, 1927	Admission rate per 100,000 per annum	Admission rate per 100,000, year 1926
INJURIES			
Connected with work or drill.....	791	2,769	3,036
Occurring within command but not associated with work.....	461	1,614	2,017
Incurred on leave or liberty or while absent without leave.....	198	693	1,086
All injuries.....	1,450	5,076	6,139
POISONING			
Industrial poisoning.....	11	39	53
Occurring within command but not connected with work.....	5	17	195
Associated with leave, liberty, or absence without leave.....	4	14	126
Poisoning, all forms.....	20	70	374
Total injuries and poisoning.....	1,470	5,146	6,513

Percentage relationships

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave, liberty, or A. W. O. L.	
	January, February, and March, 1927	Year, 1926	January, February, and March, 1927	Year, 1926	January, February, and March, 1927	Year, 1926
Per cent of all injuries.....	54.5	49.4	31.8	32.9	13.7	17.7
Per cent of poisonings.....	55.0	14.1	25.0	52.2	20.0	33.7
Per cent of total admissions, injury and poisoning titles.....	54.6	47.4	31.7	34.0	13.7	18.6

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction," or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases, selected from January, February, and March, 1927, reports, are worthy of notice from the standpoint of accident prevention:

Hatchway hazards.—While hanging clothes in an insufficiently lighted compartment, a man fell through an open unguarded hatch. Injury, sprain of knee. Loss of time, 10 days.

A man fell with a ladder which, due to the fault of some other person, had not been properly secured. Injury, contusion of the hip. Loss of time, three days.

Hatch cover hazards.—Failure to put a hatch cover pin in place resulted in the injury of a man on board a destroyer. He was coming out of a shaft alley when heavy seas caused him to slip. He caught hold of the hatch cover which fell on his hand. Injury, contusions of fingers. Loss of time, five days.

Another man was also injured by an unsecured hatch cover which fell on his hand. Injury, fracture of a finger. Loss of time, 48 days in hospital.

A hatch cover on board a cruiser was not secured as it should have been by a man who opened it. It fell on the next man who passed through. Injury, lacerated wound of a hand. Loss of time, 21 days.

Gangway hazards.—A man fell from a gangplank without hand-rails leading from a dock to a transport. He was drowned.

Defective lines.—A defective, worn-out line parted while hot bitumastic material was being lowered in a dry dock incidental to work on a submarine boat. A man working in the dock was severely burned. Loss of time, nine days.

A defective life line on the bridge of a submarine tender gave way and a man fell overboard, rupturing an ear drum as he struck the water.

Hammock hazards.—A man swung his hammock to a hatch cover which was not properly secured. The cover fell on him while he was asleep. Injury, lacerated wound of an ear. Loss of time, five days.

Gasoline hazards.—A man with a bandage on his hand was cleaning a gasoline torch. The bandage became saturated with gasoline. He was smoking a cigarette. Injury, burn of the hand. Loss of time, six days.

Another man was cleaning oil burners with gasoline. He also was smoking a cigarette. Injury, burn of the hand. Loss of time, 11 days.

A man in a motor boat was cleaning the engine with gasoline. His hands and arms were covered with gasoline. A short circuit caused a spark. Injury, burn of hand and arm. Loss of time, 19 days.

Two men at different stations threw gasoline into open fires. Injury in one case, burn of hand. Loss of time, 14 days. Injury in the other case, burn of leg. Loss of time, 2 days.

Kerosene hazards.—An officer used kerosene to start a fire in a stove at his home. An explosion occurred. Injury, burn of hand. Loss of time, 6 days.

Chemical agents, disinfectants, and drugs.—Cresol, employed to disinfect a toilet seat at a naval training station, was not properly removed. A man using the seat received chemical burns of the buttocks. Loss of time, 17 days.

Carelessness resulting in the explosion of a 30-30 cartridge.—A fireman was using a soldering iron and accidentally touched the cap of a cartridge lying on the bench at which he was working. The cartridge exploded and a fragment caused a punctured wound of an eye which eventually led to invaliding from the service on account of blindness of that eye, after 98 sick days. The medical officer reported that the accident was not due to negligence but gave no reason for his conclusion.

Unsafe practice.—A marine held a lighted match to a box of shoe polish to soften it. The polish ignited. Injury, burns of the face. Loss of time, five days.

Unsafe practice.—A shark's head had been severed from the body and suspended from a line on the deck of a ship. Curiosity prompted a man to feel of the shark's teeth. The jaws suddenly closed on his hand. Injury, lacerated wound. Loss of time, seven days.

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THE MEDICAL DEPARTMENT OF THE NAVY



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CAPTAIN D. N. CARPENTER, MEDICAL CORPS, U. S. NAVY
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Edited by
COMMANDER L. SHELDON, Jr., MEDICAL CORPS
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The UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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OCTOBER, 1907

SPECIAL ARTICLES

PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,

Surgeon General, United States Navy.

NOTICE TO SERVICE CONTRIBUTORS

Contributions to the BULLETIN should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscript and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

U. S. NAVAL MEDICAL BULLETIN

VOL. XXV

OCTOBER, 1927

No. 4

SPECIAL ARTICLES

CHINESE MILITARY MEDICINE

By J. L. MCCARTNEY, Lieutenant (Junior Grade), MC-V (G), United States Naval Reserve¹

The eyes of the world are focused on China, and prospects of occidental hostilities loom high, with the result that everybody takes renewed interest in things Chinese. Chinese military medicine has nothing to add to the progress of science, but Chinese medicine in general has some really interesting practices to relate.

Medicine in China may be considered under two divisions—the purely superstitious, which depends on charms and magic, largely fostered by Taoist priests, and the art of medicine as practiced by Chinese doctors. These two phases of treatment of the sick are closely interwoven with one another, so that it is sometimes impossible to draw the line between them.

In almost every Chinese city may be found temples dedicated to the "Spirit of Medicine," or healing. The ignorant people, especially women, believe that the deity presiding in these temples can restore health upon the payment of small sums of money to the priest and the performance of certain rites.

Chinese medicine, like philosophy, rests on a dualistic basis. At the bottom of all the laws of the universe are two principles—the "yang" and the "yin." They are generally represented by a circle divided into two parts, each of which is a comma-shaped object resembling a serpent. One is white and the other black, or one is green and the other red. The outer circle represents the great absolute and the two divisions within it, the "yang" and the "yin." Also, the "yang," or male element or force, is represented by straight lines, and the "yin," or female element, by broken lines. This diagram was devised by a Chinese emperor about the year 2900 B. C., and its two divisions are supposed to be a perfect emblem of the balancing of the forces of the universe. This sign is displayed over most doorways in China to ward off evil spirits. The principle of duality typified by the "yang" and the "yin" is more comprehensive than "male" and "female." They stand for positive and negative,

¹ St. Elizabeths Hospital, Washington, D. C.
60294—27—2

the sun and the moon, light and dark, acid and base, heaven and earth, and they correspond to Ohrmuzd and Ahriman of the Zoroastrians, Osiris and Isis of the Egyptians, the even and the odd of Pythagoras.

The universe with its dual forces is a Macrocosm. Man is the Microcosm. It is stated that as heaven has its orders of stars and earth its currents of waters, so man has his pulse. As earth has its water courses, called lakes, springs, etc., so man has his courses in the pulse, the three "yang" and the three "yin."

The priests explain these forces of the universe by personifications in the forms of evil spirits or devils, and the people are kept in constant fear of these demons of the air, which they believe are constantly bent on bringing disease or death. Hence the many superstitious practices resorted to for deceiving or warding off the evil spirits. The priests recite incantations, paper money is burned, and the pentagon is hung over the doorway. The demons are thought to be especially fond of marring beautiful children, hence the parents invent disgusting names for their offspring in the hope of misleading these tormentors. Boys are especially liable to injury at the devils' hands. Hence a guest never inquires into the sex of a new-born child, and a boy is often dressed as a girl and called by a female name.

The Chinese physician is quite a different individual from the Taoist priest, although magic and astrology are inextricably bound in with his theories of the human organism.

The first authority on medicine in China was the Emperor Shan Nung, who lived about 2737 B. C., and who made a classification of some hundred medicinal plants. A later emperor, Wong Tai, wrote up medical science so far as it had progressed in 2697 B. C. In the earlier ages there was some progress in anatomy, but for the last 1,000 years at least there has been practically no advance. The profound respect for the dead has interfered with dissecting and the performing of autopsies. Again, there is no cooperation between Chinese doctors nor any organization of native trained practitioners. The so-called National Medical Society in Shanghai and Academy of Medicine at Peking have no jurisdiction over physicians in other parts of the country. The former organization is made up of Chinese trained in occidental medicine, while the latter is a purely native institution which gives instruction to young men in the medical classics. The practice of medicine in China is unlicensed. Most native doctors receive their library from a father or relative, who also imparts the secret remedies on which his reputation was established. During his apprenticeship the young doctor diligently studies the classical books and practices palpation of the pulse. The doctor is called upon only for more serious maladies. For the simpler com-

plaints home remedies and the formulas of old women are used. As a general rule in times of war the Chinese soldiers attend to their own wounds. Advertisement is quite ethical, and the office of a doctor may be recognized by the tablets displayed about the entrance, on which the skill of the physician is testified to in high-sounding phrases. These testimonials are usually signed and presented to the doctor by grateful patients. The name of the doctor is of great importance, which accounts for such names as Dr. "Root-of-Strength," Dr. "Rhubarb," and Dr. "Salts of Hartshorn."

The Chinese conception of physiology and anatomy is fanciful to the extreme. The body is said to be divided into three parts: (1) The upper, or head; (2) the middle, or chest; and (3) the lower part,



FIG. 1.—Shan Nung, known as "The Father of Medicine." Supposed to have lived 2737 B. C. (From an old print.)



FIG. 2.—Wong Tai; lived 2697 B. C. The real "Father of Medicine." (From an old print.)

or abdomen and lower extremities. Life depends on the equilibrium of the "yang" and the "yin." It is but one manifestation of the universal life. The "yang" is the warm principle, actively flowing. The "yin" is the moist principle, passively flowing. As the whole order of the universe results from the perfect equilibrium of these two forces, so the health of man depends upon their equilibrium in the body. If the "yang" or active principle predominates, there is excitation; if the "yin" or passive principle predominates, there is depression of the organism. The action of these two forces manifests itself through 11 organs—the heart, liver, lungs, spleen, left kidney, large and small intestines, stomach, gall bladder, urinary bladder, and right kidney. The lungs are divided into four large and two small lobes. The liver has seven distinct divisions. The gall bladder is the seat of courage. The urine passes directly from

the small intestines into the urinary bladder, through the ileocecal valve. The brain and spinal marrow produce the semen, which

passes directly into the testicles. There are said to be 365 bones in the body.

Functionally the viscera are divided into two groups known as the six viscera, in which the "yang" resides, and the five viscera, in which the "yin" resides. The first group is composed of the gall bladder, stomach, small intestine, large intestine, bladder, and left kidney, with its three heat centers, the three lumbar sympathetic ganglia. The five viscera are the heart, liver, lungs, spleen, and right kidney. The diaphragm is placed beneath the heart and lungs and covers the intestines, spine, and stomach. It is an impervious membrane and covers over the foul gases, not allowing them to rise into the heart and lungs. The stomach, spleen, and small intestines are the digestive organs. They prepare the blood,

which is received by the heart and set in motion by the lungs. The liver and gall bladder filter out the various humours. The lungs expel the foul gases. The kidneys filter the blood, while coarser material is excreted by the large intestines. The "yang," which

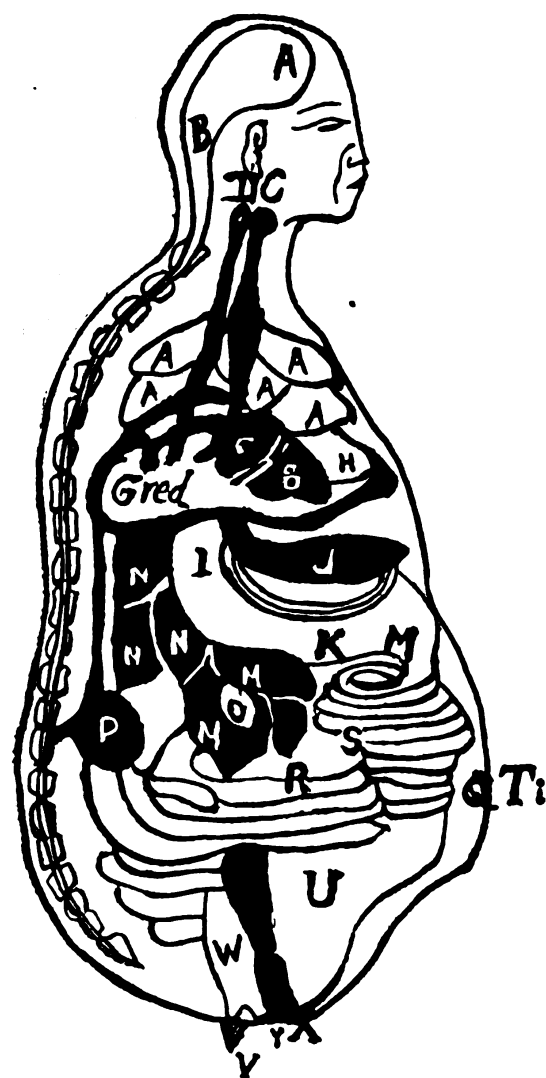


FIG. 3.—Chinese notion of the internal structure of the human body

A, B, brain; C, larynx; D, pharynx; a, a, a, lungs; b, heart; c, pericardium; d, bond of connection with the spleen; e, esophagus; f, bond of connection with the liver; g, bond of connection with the kidneys; h, diaphragm; i, cardiac extremity; j, spleen; k, stomach; l, omentum; m, phlorus; n, n, n, n, n, liver; o, gall bladder; p, kidneys; q, small intestines; r, large intestines; s, caput coli; t, navel; u, bladder; v, the "gate-of-life," sometimes placed in right kidney; w, rectum; x, y, urinary and fecal passages.

is of subtle nature, has a constant tendency to rise. The "yin," which occupies the brain and vertebral column as well as the five viscera, tends to descend.

“yang” and six carry the “yin.” These two forces are disseminated through the whole organism by means of the gases and the blood. The former act upon the latter as the wind upon the sea. The interaction of these two as they circulate in the vessels produces the pulse. The blood makes a complete circulation of the body about fifty times in 24 hours. In these 50 revolutions the blood passes twenty-five times through the male channels, or those of the active principle, and twenty-five times through the female channels, or those of the negative principle. The blood is said to return to its starting place once in every half hour, instead of once in 25 seconds, according to modern physiologists, having traversed a course of some 54 meters.

Each organ is related to an element; fire rules the heart, metal the lungs, etc. There is likewise a close relationship to the planets, to season, color, and taste. This interrelationship is well illustrated by the table which follows:

ORGAN	PLANET	ELEMENT	COLOR	TASTE
Stomach.....	Saturn.....	Earth.....	Yellow.....	Sweet.
Liver.....	Jupiter.....	Wood.....	Green.....	Sour.
Heart.....	Mars.....	Fire.....	Red.....	Bitter.
Lungs.....	Venus.....	Metal.....	White.....	Sharp.
Kidney.....	Mercury.....	Water.....	Black.....	Salt.

Auscultation and percussion are wholly unknown as diagnostic aids to native Chinese physicians. Entire reliance is placed in palpation of the pulse and the general facies of the patient in making the diagnosis. The taking of the pulse is almost like a solemn rite.

The pulse may be palpated at 11 different points, as follows, radial, cubital, temporal, posterior auricular, pedal, posterior tibial, external plantar, precordial, and in three places over the aorta. Usually, however, the physician is satisfied with the palpation of the pulse of the right and left wrist. With the right hand he feels the left pulse and with the left hand the right pulse. He applies three fingers—the ring, middle, and index fingers—over the pulse and the thumb underneath the wrist. Then he palpates the pulse with each finger successively. Under the ring finger the pulse of the right hand reveals the condition of the lungs, middle of chest, and large intestines, while the ring finger on the left hand determines the state of the heart and the small intestines. The pulse under the middle finger corresponds on the right to the condition of the stomach and spleen, on the left to the state of the liver and the gall bladder. The index finger placed over the pulse of the right radial shows the condition of the bladder and the lower portion of the body; over the left radial it reveals the state of the kidneys and

ureters. For each of these six pulses the physician must practice weak, moderate, and strong pressure, to determine whether the pulse be superficial, moderate, or deep. This must be done during complete inspiration. If the pulse be rapid, the "yang" principle is predominant, if slow, the "yin" is predominant. There are 24 main varieties of pulse. The Chinese physician must be trained to palpate the pulse so skillfully that by this single means the nature of diseases and even the months of gestation in a pregnant woman may be determined. Ten or more minutes must be spent in the palpation of the pulses.

Chinese physicians may consider other factors besides the pulse, for it is said that by examination of the tongue 36 symptoms may be diagnosed according to whether the tongue is white, yellow, blue, red, or black, and depending on the extent of the coating. From the general appearance of the face and nose the state of the lungs may be discovered. Examination of the eyes, orbits, and eyebrows shows the condition of the liver. The cheeks and tongue vary with the state of the heart; the end of the nose with the stomach. The ears suggest the conditions of the kidneys; the mouth and lips the state of the spleen and stomach. The color and figure of the patient also count in diagnosis.

Diseases are spoken of as internal and external. External cases are those on the surface, such as skin affections and tumors growing on the surface. All surgery has been classified as the practice of external diseases. Internal diseases include all fevers, and diseases of the heart, lungs, and abdominal organs. More specifically, diseases are classified under nine heads as follows: (1) Affections of the great blood vessels, including smallpox; (2) diseases of the lesser blood vessels; (3) fevers; (4) female complaints; (5) cutaneous diseases; (6) conditions requiring acupuncture; (7) diseases of the throat, mouth, and teeth; (8) disease of the bones; (9) affections of the eyes.

Diseases are said to be produced by internal and external agents. Among the external agents are (1) wind, which causes headache or apoplexy, dizziness, chapping of face, diseases of the eye, ear, nose, tongue, teeth, etc.; (2) cold, which may cause cough, cholera, heart pains, rheumatism, and abdominal pains; (3) heat, the cause of chills and diarrhea; (4) dampness, from which come distention of the abdomen, watery diarrhea, gonorrhea, nausea, pain in kidneys, jaundice, anasarca, pain in small intestines, and pain in the feet; (5) dryness, the cause of thirst and constipation; and (6) fire, the agent which causes pain in the sides, diabetes, etc. The diseases of internal origin are classified as disorders of the gases, bloody sputum, and depressed spirits.

The treatment of disease by the native doctor consists chiefly in the administration of drugs. Surgery has been an unknown art. Bullets are removed by placing a kind of plaster at the entrance wound. It is claimed that the ingredients of the plaster have a remarkable magnetic power over the imbedded bullet and gradually draw it out through the same opening by which it entered.



FIG. 5.—The famous surgeon Hwa T'o operating on Kwan Tai, while he quietly converses with a friend. 221 A. D. (From an old print.)

Perhaps in no line does the native practitioner show his ignorance more than in the treatment of fractures. No attempt is made to reduce the parts. A special clay is placed in a wooden bowl. The heads of several chickens are cut off, while incantations are repeated and the blood is allowed to flow on the clay in the bowl. Blood and

clay are now mixed together and applied to the fractured extremity. Bandages are used to bind on thin strips of bamboo. When the last turn of the bandage is being wound on, the blood of another chicken is poured over it.

The only real operation performed by the Chinese is the castration of eunuchs. Castration also is supposed to be a penalty for adultery. With one sweep of a sharp knife the genital organs are completely removed on a level with the skin of the pubis. A metal plug is inserted in the urethral opening and a cloth rung out of cold water is applied to the bleeding surface and firmly bound on. The patient is allowed to drink no water for three days, after which the dressing is removed, the plug withdrawn, and the patient allowed to urinate.

The great Chinese *Materia Medica* compiled in the 16th century is composed of 52 books and contains 1,892 remedies. The drugs and other medicaments are weighed out according to a decimal system as follows:

1 tael or leung equals 40 grams.

1 tsin equals 4 grams.

1 fan equals 0.4 gram.

1 lei equals 0.04 gram.

1 ho equals 0.004 gram.

A certain drug may be prescribed because of its resemblance to the organ affected. Thus for renal diseases, haricot or kidney beans are given. Minerals are administered as salts. Plants are used in the form of roots, stems, leaves, flowers, and dried fruits. The bones of a tiger are frequently ground up and given to a debilitated person. The grasshopper is dried and used as a medicine and the shells of the cicada are collected from the bark of trees and mixed with other ingredients. Tinctures and extracts are prepared from rice wine. Pills are often made with a thick shell of paraffin which is broken off and the contents chewed up. Various forms of plasters and blisters may be applied to the skin. The actual cautery is often used as a revulsive.

Among the pills the best are the "Wai Shaang Uen," or life-preserving pills, costing about a dollar apiece. They are composed of Manchurian ginseng, deer's horns, and other drugs. Among other common remedies may be named dried, powdered, rattlesnake skins, the bile of the ox and dog for jaundice, dried shrimps, etc. Quicksilver is often poured into gunshot wounds in order to dissolve the bullet. In some drug shops two signs are hung at the entrance; on one are written the names of venereal diseases, on the other such diseases as hemorrhoids, wounds, ulcers, etc. The patient explains in which class his disease belong and is promptly given the appropriate remedy.

Diseases of the liver and eyes, which are sympathetic organs, are cured by giving pork liver. In some parts of China human blood is considered an excellent remedy and at executions people may be seen collecting the blood in little vials. It is then cooked and eaten. A genuine prescription written by a physician to be used as a laxative was composed of *Rumex hydrolpathium*, *Quercus glauca*, Sodium sulphate, and *Magnolia hypoleuca*. The plants were boiled with the sodium sulphate and the "tea" taken by the patient.

A patient in extremis may be treated as follows: A rooster is killed and the body is cut in half, longitudinally, and the bleeding half is quickly applied to the skin of the patient's abdomen. If there be any possibility of cure this is supposed to be infallible.

The use of the acupuncture needle is common throughout China. The theory on which it is based is that if the blood vessels connecting different organs are punctured the disease will be aborted. Three hundred and eighty-eight points suitable for acupuncture are described. There is a mannikin at Peking pierced with holes at all the points suitable for acupuncture. Paper is pasted over it and students learn to find the proper holes through the paper. The needles vary from 1½ to 28 centimeters in length and are made of gold, silver, or steel. During the operation the patient coughs and the errant humours are directed back into their normal courses.

The native practice of "needling" different parts of the body has undeniably produced woful consequences, particularly when dirty needles have been thrust into joints with incipient disease. There is a wide difference, however, between an ignorant person, such as the untrained native "doctor," using a dirty needle for all sorts and conditions of disease, and the use of a perfectly clean needle with skill and knowledge, in the hands of a modernly trained physician, although in some cases more good than harm may be done even by the native "doctor." Chinese patients very readily submit to this form of treatment, as they are familiar with it, and will most often ask for treatment by the needle, whether by "hypo" or acupuncture.

As to medicinal remedies, though the Chinese have many drugs which are common to the pharmacopoeias of western lands, others are so strange and repellent that it is not surprising if foreign physicians in China are inclined to condemn the whole system of native practice and seldom use Chinese drugs. On the other hand, while admitting that western surgery is far beyond the range of the native surgeons, the Chinese have not an equally high opinion of occidental medicinal treatment, except in those diseases for which it is known that the foreigner has specific remedies, and, generally, when the

Chinese are sick they prefer to go to their native doctors. This attitude is taken not only by the lower classes, unacquainted with the learning and civilization of the west, but also by those who have received a foreign education and some of whom who have lived abroad.

No doubt this preference for what is peculiarly their own is partly due to national prejudices, of which one striking instance may be given. About 30 years ago the Chinese minister to London was a remarkable scholar named Lo Fung-luh. Educated in the west, he had acquired an almost encyclopedic knowledge of western, and especially of English, literature. He was a fine Shakespearian scholar and was as familiar with Chaucer as with Herbert Spencer and John Stuart Mill. It was he who composed for his patron, Li Hung Chang, the remarkable series of speeches which, by their liberal and lofty philosophy, astonished the western world during that statesman's visit around the globe. During the last illness of Lo Fung-luh an English friend came to see him. At the time of the visit "he was lying on a low couch, and he pointed to a little wizened Chinese who was crouching beside him on the ground over a smoking brazier. For about five minutes the Chinese medicine man continued to chant in a shrill native voice, while from time to time he took up a pinch of ashes from the brazier and sprinkled them over different parts of Lo Fung-luh's body with strange passes and incantations. He thereupon kow-towed three times and retired. 'I thought, my dear friend,' Lo Fung-luh then said to me, 'it might interest you to see how a Chinese steeped in your western literature, saturated with your western science and philosophy, dies—a Chinese.'" The narrator adds: "I shall never forget this weird and pitiful scene, enacted in the heart of London, nor the pathos and sincerity of the lesson which it was meant to convey." Perhaps the reader does not appreciate to the full the depth and strength of the feelings and beliefs which separate in so many ways the Chinese from the occidental.

But the preference for their native system of medicine is not wholly due to national prejudice. The Chinese, generally, do not all admit that structurally and physiologically they are exactly the same as foreigners; hence they believe that the native doctor better understands them when ill than do foreign physicians with all their learning. Moreover, they stoutly assert that some of the medicines which the occidental despises are of great value, curing their diseases when foreign medicines fail, and there are others equally efficacious of which foreigners are totally ignorant, held for the most part by private practitioners as secret remedies. In support of this contention, numerous cures, some of them very remarkable, are reported by all classes of Chinese.

It may be objected that the cures reported never really occur, or, if they do occur, that they are due to more or less clever hocus-focus of the native doctor and the patient's own faith or imagination. This explanation can not be accepted in many cases. Foreign physicians as well as the Chinese bear witness to the surprising efficacy of some of the native drugs even in such a disease as leprosy. Besides, such disbelief is not wholly reasonable as it ignores probabilities. If quinine, emetine, and arsphenamine were held as secret remedies, the cures resulting from their administration in the diseases for which they are specifics would be wonderful to outsiders. An investigation of Chinese drugs is not altogether fruitless. For instance, in cases of dropsy the Chinese have for long used a medicine called "Ma Huang" which they obtain from the skins of toads. It has been discovered that the skins of certain species of toads yield powerful substances such as bufagin, bufotalin, and bufotoxin; that bufagin is really efficacious in dropsy, and that research workers recently have prepared ephedrine from Ma Huang, which has an action similar to that of adrenalin. It may be that other Chinese remedies, if similarly investigated, would be found of great value. Other drugs which are of common use in Chinese medicine are ginseng, rhubarb, sulphur, pomegranate root, aconite, opium, arsenic, and mercury.

No doubt the psychic effect produced by the remedy being a secret one and the use of chanting, passes, incantations, and other religious aids has much to do with the cure in certain cases, but it does not explain all. Whether medicines which are prepared privately may not be fresher and better in every way than the same medicines obtained by public purchase, and whether some of the effective remedies used by the Chinese may not be well-known drugs masquerading under strange names, are questions which can not now be considered. The main point is, the Chinese are convinced that native medicines are often most efficacious, certainly in the diseases of their own people, and that foreign physicians do not appear to know what these medicines are, with the result that most Chinese, educated or otherwise, usually try their native medicine or "doctors" for some time before they come to a foreign physician. Thus the hygiene and medical treatment in the Chinese Army are almost wholly by native methods, although the wounds of war are generally treated in semi-occidental ways. In fact, foreign doctors and missionaries are often asked to care for the casualties, and the routine of the Chinese Army dressing stations and hospitals is somewhat westernized.

Since the revolution of 1911, which overthrew the Manchu government in China, there has been no settled government for any length of time. A change of administration, preceded by military movements, has occurred almost annually. During the first few

years after 1911 the casualties from these revolutions were of minor importance because of the primitive methods of warfare, but with the increasing size of the Chinese armies and the use of modern weapons of war, the fighting has become more serious. It is stated on authority that there are at least 2,000,000 Chinese soldiers under arms at present in the different factions.

Most of the armies have more or less organized medical units, but the rights of the Red Cross are very generally abused by the natives and military alike. The armies are for the most part made up of men from 20 to 30 years old, and in good physical condition, although not prone to obey hygienic laws. The youngest soldier patient to come under treatment was 13 years old and had been in the army for 3 years.

During the period of a year, at one of the large foreign hospitals, 1,138 wounded soldiers were treated. There were probably 20 to 40 times that number of wounded soldiers throughout China during the year who were allowed to die on the various battle fields, in transit, or were cared for in the native military and other foreign hospitals.

Most of the missiles removed from the wounded soldiers were jacketed rifle bullets of various lengths, diameters, and shapes. Many wounds were also inflicted by shells, shell splinters, and shrapnel bullets, and by bullets from automatics and revolvers. There were two types of dum dum bullets—large lead slugs and jacketed rifle bullets with tips filed off, sometimes with lateral slits. Some partially jacketed dum dums were evidently manufactured in an arsenal, as they were seen in the clips of some of the soldiers. One in five of the wounded had retained bullets of some variety. In almost all cases the hosts desired to have them removed, whether they were causing pain or disability or infection or not, regardless of the advisability or inadvisability of such operation.

The condition of the patients and of the wounds depended upon the distance from the hospital when wounded, the means and rapidity of transportation, and the efficiency, or reverse, of the army medical service. The field service in all cases is extremely inadequate. When the fighting is in or near one of the large cities, the percentage of clean wounds and of cures is fairly satisfactory, even in the more serious cases, as the Chinese seem possessed with a natural resistance seldom found in the occidental. In the cases reported in this series, some came from a distance, but transportation by rail and steam launch was possible, and fairly rapid and comfortable. Some of the cases had received competent first aid promptly, which is accounted for by the fact that many of the doctors and nurses in the armies are graduates of mission medical schools or nurses' training schools. Some of the cases were brought in days, weeks, or months

after being wounded; anemic from hemorrhage, weak from malnutrition and fever, and with infected wounds. Some had coexisting diseases, such as malaria, beriberi, and dysentery. A few had gas gangrene. Some cases of gangrene were caused by the long-continued pressure of tourniquets or splints. The fresh wounds were frequently covered with dirty plasters and powders to stop hemorrhage. Shredded tobacco is often used as a hemostat, and rough bamboo-fiber paper is a common wound dressing. Invariably, suppurating wounds were kept closed by plasters and not allowed free drainage.

Wounds of the thigh, without fracture, were the commonest single type of injury seen, with perforating wounds of the chest a close second. In order of frequency then came perforating wounds of the abdomen, injuries to the leg, the upper arm, and fractures of the femur. Of the 1,138 wounds seen, 40 per cent were of the lower extremities, 20 per cent of the upper extremities, 12 per cent of the chest and wall, 8 per cent of the abdomen and wall, 8 per cent of the head, 6 per cent were multiple wounds, 3 per cent were of the neck, and 3 per cent of the back, while 1 per cent were of the external genito-urinary organs.

In most cases both entrance and exit wounds were present, and it was evident that the missile had taken the shortest and most direct course from the one to the other. It could usually be readily determined which was the entrance and which the exit wound, also what foreign body caused the wound, whether a jacketed bullet or a dum-dum, a shell fragment or shrapnel. Most cases had received one wound only. A large number had retained the bullet. Some missiles pursued long or irregular courses or both. Some bullets pierced the trunk or limb, left and reentered it again at some close or distant point. Multiple wounds were produced sometimes by one bullet, sometimes by two or more; therefore in some cases there were many retained foreign bodies, different bullets or fragments, close together or long distances apart. Some cases had bullets retained from wounds received previously, as some of the men had been shot two or more times in the same campaign and others in previous campaigns. The wounds caused by shell fragments and shrapnel bullets and those by dum-dum bullets were large and ragged, with much destruction of tissue, structures, and organs, and frequently contained pieces of clothing, and were usually infected.

Lead bullets, being large and blunt nosed, produced large wounds, external and internal, and often mushroomed against a bone and were destructive, particularly if they spread, lacerating the tissues and producing comminuted and complicated fractures of the bones, in the case of the long bones sometimes for a length of 10 inches.

The jacket and core sometimes separated, traveling different lengths or in different directions, a portion leaving the body and a part being retained. Pieces of clothing usually accompanied them, and so they were generally septic. In rare cases the dum dum did not mushroom and acted like a pointed jacketed bullet. A dum dum is more likely to take an irregular course and to turn on its long axis, which adds to the internal destruction of tissues.

In a number of cases there was extensive injury to skull and brain. In one case the bullet had entered through the external auditory meatus. In another a cannon burst and a fragment struck the soldier on the skull, right temporal region. There was a complete fracture of the vertex, a plate of the temporal bone 2 inches in diameter was driven in, and smaller fragments were in the substance of the brain, and yet the man made an uneventful recovery. Some were good cases for the study of cerebral localization. In the wounds of the face and jaws there was generally extensive loss of tissue and these were difficult to close.

A transverse wound through the thoracic cavity was usually hopeless. Many with anteroposterior wounds merely required conservative treatment. Late cases were usually full of pus. In a number of cases the bullet lodged in close proximity to the great vessels at the root of the neck without hopelessly damaging them. Four or five bullets were in very close relation to the heart, root of the lung, and aorta. One dum dum, which fortunately did not spread although it turned completely around on its main axis, perforated the pericardium and the heart wall, and yet the patient returned to active service after treatment. Several aneurisms of the great vessels required attention. When the lung did not immediately collapse, a sharp-pointed end of a fractured rib injured the subjacent lung, and sometimes entered through the diaphragm into the liver. One patient, who had been shot through the chest, the missile entering the right abdomen, presented a fistula through the diaphragm, through which bile, and later intestinal contents, discharged.

Five cases had wounds of both chest and abdomen. A fair proportion of those with gunshot wounds of the abdomen recovered, some with and some without operation. Transverse wounds were more likely to have a fatal termination. Wounds of the duodenum and pancreas, and usually also extensive wounds of the large bowel, were fatal. A number of soldiers wounded in the liver, spleen, and kidney survived. One patient was shot in the abdomen, through both right and left quadrants, the entrance wounds being about 18 inches apart. The bullets met in the pelvis, and were found side by side, projecting through the posterior parietal peritoneum, anterior to the sacrum. In another case the bullet had perforated the lumbar vertebrae,

entering from the rear, and was projecting into the pelvis, through the peritoneum, in the bifurcation of the abdominal aorta. A bullet passed through a full cartridge clip of one man, perforated two metal cartridges without exploding them, and then entered his abdomen. A bullet was found rolled up in the omentum in one case, having traveled from the patient's upper arm, through the thorax and upper abdomen. Fecal and urinary fistulæ sometimes were sequelæ. Ascaris worms were frequently found wriggling through perforations in the bowel, usually the small intestine, or free in the abdomen, as Chinese are practically all infested with intestinal parasites. One man was drilled by machine-gun bullets through both the ascending and descending colon.

The spinal cord was in all spine wounds either completely severed or practically so. In the case of dum dum bullets, pieces of the bullet were scattered throughout the length of the wound through the bones and the tissues beyond.

The posterior is a better protection against bullets than the anterior abdominal wall. In cases shot from behind, the missiles were frequently still in the wall, although in other cases the bullet continued on into the abdomen.

In wounds of the shoulder the brachial plexus was often injured and became adherent in scar tissue to neighboring structures. Three cases were admitted at the same time injured in this way. When dum dum bullets struck the humerus the bone was a complete wreck for a very considerable length. Usually also the musculospiral nerve was severed or became involved in the callus. The axillary and brachial vessels were lacerated in one case for a length of 1 inch. Sections of muscles were sometimes also cut away by the same missile. Many such arms were amputated, but a good number were saved. One man had both elbow joints shattered. An aneurism of the palmar arch was a novelty, and aneurisms of the vessels of the upper were much rarer than of the lower limb.

Wounds of the pelvic bones usually became infected. As stated above, more soldiers were shot in the thigh than in any other region, and the femur was more often fractured than any other bone. The femoral vessels were usually lacerated, as well as the sciatic nerve. In a few cases the soldier had been crouching, and a bullet entered and left the thigh, to reenter again lower down in the leg.

One case had a very extensive injury to the femur, with extravasation of blood and retention of the bullet. The condition of the femur was seen and the bullet located with X rays. The bone was shattered for a length of 8 inches. Amputation was advised but refused. The patient had been suffering considerable pain and was worn out. Under spinal anesthesia work was begun on his thigh; the sharp

fragments of bone were removed, the wounded artery repaired, drainage provided for, and a suitable splint applied. During the operation the patient fell into a natural sleep. Although he had seen the radiograms, and appreciated the absence from pain during and after operation, he left the hospital the following day, stating that a native doctor had guaranteed to heal his thigh within two weeks.

One old case had a lead slug retained in the shaft of the femur, surrounded by callus, with a sinus leading to the surface. A bit of his clothing had also been carried in. Another patient was found to have the metal case in the great trochanter, and the lead core farther on in the neck of the femur. Sepsis made it necessary to remove both. One soldier shot though the knee presented wounds of entrance and exit. In cleansing the wound, a large-sized metal cartridge case, 2 inches in length, was found in the wound. Being evidently too small for the gun, it had accompanied the bullet and became lodged in the bone, while the bullet continued on its course. Aneurisms of the femoral artery were relatively common, usually in the upper part of the thigh. Ankle wounds were unsatisfactory. The men preferred an ankylosed joint to amputation.

Several soldiers had their external genito-urinary organs partly or completely shot away.

Tetanus complicated wounds of the thigh more often than those of any other region, which may be due to the fact that the largest number of wounds were there. Erysipelas and gas gangrene were also more common in the lower limb. Fortunately, these complications were not common, which may be accounted for by the natural high resistance of the Chinese, and the fact that *B. tetani* is quite generally an inhabitant of the Chinese bowel.

Exit wounds could usually be differentiated from the entrance wounds in the case of an ordinary rifle or revolver bullet, but not so readily when caused by a dum dum or fragment thereof, or in the case of a ricochet. These may be confused with a deep gutter wound caused by a passing or glancing bullet. In one case there was a large ragged wound near the metatarsophlangeal joint of the first toe, which resembled a wound of exit. It was too deep for a gutter wound. No entrance wound could be found. With the fluoroscope a rifle bullet was found embedded in the os calcis, with the nose pointing forward. It was, of course, a ricochet, having entered the foot backward.

In the case of a dum dum, the jacket and the core may be found in different localities, or parts of the missile may be widely scattered throughout the wound. There may be wounds of entrance and exit and yet retained fragments. There may be multiple external wounds caused by two or more different bullets. It is sometimes difficult to

judge the course of a bullet, and therefore the probable internal injury, particularly if it has not a jacket and point or comes in contact with a bone. The bullet may travel a long distance through the soft tissues, and sometimes it is necessary to search systematically the whole body. A bullet may enter the body at the root of the nose and be found in the posterior abdominal wall, or enter the arm and be found in the pelvis. A bullet may enter through a natural body opening and be retained, showing no external wound whatever. A missile may glance off a rib and travel around the body. One may leave the trunk or a member and reenter elsewhere. Other foreign bodies may enter with a bullet.

One case in point was that of an officer who had some unused cartridges in his pocket. The bullet which hit him struck one of the cartridges, exploding it. The bullet from the exploded cartridge went elsewhere. The cartridge case was driven by the bullet into the officer's abdomen. The entrance wound in the left quadrant, posterior, about 3 inches above the crest of the ileum, was large and ragged, evidently not that of a jacketed bullet. There was no exit wound. The holes in his clothing were ragged. The X ray revealed two missiles in the abdomen. Laparotomy exposed the shell of the patient's cartridge in the lumen of the descending colon near the sigmoid. The bullet which hit him was found in the omentum, mid-abdomen, hypogastric region. There was a rent in the descending colon near the splenic flexure, and 3 inches of the bowel was contused.

The wounded almost universally desired the removal of the foreign bodies, superstitiously fearing fatal or pernicious consequences. The foreign body was regarded to be the cause of their trouble. In most cases this was a desirable procedure, and the offending object was removed. In a few cases, although it would probably have been safer to leave the missile in situ, it was removed because the psychological effect of nonremoval was more dangerous than the operation.

In all the war wounds treated there was a total mortality of 7 per cent. Head and neck wounds resulted in a mortality of 11 per cent; those of the trunk, 17 per cent; upper extremity, 1 per cent; and lower extremity, 3.5 per cent. Wounds of the brain were 52 per cent fatal. Wounds of the hip joint and pelvic bones had a mortality of 50 per cent; those of the chest and abdomen together, 40 per cent; of the abdomen alone, 38 per cent; and those of chest, 11 per cent. Multiple wounds were fatal in 14 per cent of the cases. Compound, complicated fractures of the femur, some of the patients refusing operation when urged, gave a mortality of 10 per cent.

Summary of cases treated

Head:		Upper extremity—Continued.	
Scalp only.....	14	Elbow, fracture.....	13
Skull, fracture.....	21	Forearm.....	8
Brain.....	21	Radius, ulna, fracture.....	15
Face and jaws.....	31	Wrist.....	14
Neck.....	30	Carpus, fracture.....	22
Chest:		Lower extremity:	
Wall.....	2	Pelvic bones, fracture.....	7
Ribs, fractured.....	4	Hip.....	5
Perforating wounds.....	137	Gluteal.....	11
Back.....	21	Thigh.....	151
Spinal cord.....	9	Femur, fracture.....	4
Chest and abdomen.....	5	Aneurism.....	50
Abdomen:		Sciatic nerve.....	3
Wall, anterior.....	1	Knee.....	36
Perforating wounds.....	83	Leg.....	83
Rectum.....	1	Both legs.....	2
External genitourinary.....	6	Tibia and fibula, fracture..	41
Upper extremity:		Ankle.....	3
Shoulder.....	44	Ankle joint.....	31
Axilla.....	1	Foot, fracture.....	13
Upper arm.....	56	Multiple.....	71
Humerus, fracture.....	37	Not listed.....	27
Both upper arms.....	1		
Axillary artery.....	3	Total.....	1,138

So much for the casualties of warfare. But military hygiene is another subject, and yet is a part of the whole subject of military medicine. In considering this phase it has to be remembered that Chinese hygiene is the product of an evolution extending for more than 2,000 years before the Christian era. There are no Chinese sanitary laws like those of the Mosaic code, but the Taoist religion is based largely on health maxims, though these are lost among a mass of superstitious absurdities and spirit lore. In the *Su-wen*, a book which is 2,000 years old, the philosophy of the body and of health is fully developed in the old Chinese way. It defines sanitation as health preservation so as to live to old age. It holds that true sanitation is in conformity with nature's laws. Everyone who attends to these can live to be a hundred years old. The Chinese know that in order to live long they must live moderately. They have two main laws of health which are very comprehensive, although not very generally observed, namely:

- (1) Restraint of all the appetites.
- (2) Cleanliness in house and person.

Regarding the attitude of the Chinese to modern public-health measures it may be noted that their prejudices are strong. The Chinese, as stated before, are a people with a supporting belief in all kinds of drugs, charms, and spells, while their medical meth-

ods are empirical and mostly founded on the fancies of the alchemistical religion of Tao. The Chinese drug shops contain an immense number of drugs and preparations and are the most elaborately ornamental of all shops. The Chinese spends a large part of his income on medicines. It is not surprising, therefore, that modern public health measures, which are founded on organized common sense and from which the personal factor of the relation between doctor and patient, with all its fallacies, is eliminated, do not appeal acutely to the military or civilian Chinese. He is attracted mostly by that part of so-called western civilization furnished by well-advertised patent medicines and itinerant quacks, for with these, the diseases that are least curable have the greater number of drugs recommended as cures, and the Chinese, though ignorant of the real cause of disease, has a proportionately great desire for a multitude of drugs.

The Chinese pharmacopœia is the largest in the world. In China, therefore, considerable breadth of view and treatment is necessary in hygienic measures. With an unsympathetic people like the Chinese, sweeping sanitary measures are difficult of operation even in military camps.

The processes of social evolution can perhaps be studied on broader lines in China than anywhere else on account of its particularly massive and concrete historical records, and the lesson appears to be that in many respects the methods of some centuries of practical experience are frequently confirmed as good even by modern science. Thus the Chinese hygienic conscience has been built up in the light of his Asiatic environment.

Chinese armies are made up mostly of coolies, who have all their lives been on the edge of starvation, and who undoubtedly joined the army primarily for subsistence and for no patriotic reasons. The problem of feeding the soldier has always been a hygienic problem in western armies, but the Chinese armies live wholly off the country occupied. Fortunately, the Chinese eats and drinks little that has not been subjected to the temperature of boiling water or boiling oil, and he is, therefore, largely preserved from typhoid fever, cholera, and other diseases which are caused by infected food. Practically everything in the Chinese dietary is cooked, pickled, or preserved, and as a general rule the Chinese is not a great raw-fruit eater. If he does eat fruit, it is always peeled. Unfortunately, the foreign soldier or sailor on duty in China does not observe this rule, but buys from every street hawker. Raw oysters, for example, the Chinese will not eat, considering them "too cold for the stomach." Except under great stress, he drinks no cold water but always tea made with boiled water, and thus avoids water-borne diseases, and he never drinks milk.

Regarding disease infection, therefore, the principles which govern the Chinese dietary are true ones. Functional diseases of the stomach and alimentary tract are less common than among Occidentals, and the teeth of the Chinese are admitted by all to be exceptionally beautiful and good. The clean-limbed, muscular Chinese of the fields is the picture of health and agile strength as he sings through the hottest or coldest day's work. Singing at work, which is practically universal through China, indicates a vital energy in excess of that required for the labor in hand. The weary worker has no song. Essentially the coolie class and Chinese soldier is a vegetarian, and a great many eat meat only once a week, once a month, or once a year. It is the universal custom to eat only two meals a day.

Regarding food, therefore, modern hygiene has little to teach the Chinese while he abides by the principle of eating and drinking nothing that has not been thoroughly cooked, is moderate in his meat eating, and temperate in his meals. He is apt, however, in a foreign environment to consume aerated waters and other unusual things, and suffers thereby.

The Chinese armies are never properly housed, and undoubtedly the greatest sanitary evil in China is overcrowding, everywhere admitted to be the worst of all unhealthy conditions and one that can not be counterbalanced by other sanitary measures. It is here that modern sanitation is diametrically opposed to the Chinese method of closely herding together, which is the result of an evolution, influenced by a feudal environment, in which the people collected together, mostly within walls, for the purpose of mutual defense against outside marauders. The billets are even more crowded than the homes, and the soldiers are packed into their quarters like sardines. They usually sleep on straw on the mud floors, or have a bare plank for a bed.

It is in the disposal of refuse that modern hygiene has the least to teach and the most to learn from the Chinese. The principle of returning feces and garbage to the soil is the only true and economical one. By this means alone can the energy residing in the soil be cheaply conserved. The water carriage of sewage, and its most modern treatment in mass by bacteriological methods, are crude imperfections when compared with the Chinese method of returning all refuse to the earth, which it replenishes, and is, at the same time, purified by the most complete bacteriological processes. The upper layer of the soil is the universal purifier; it is here that the nitrifying and other organisms reside which convert organic refuse into inorganic plant food. Before applying feces to the soil the Chinese, as a rule, allow it to undergo ammoniacal fermentation in pits and kongs, much to the disgust of the occidental olfactory sense. In

this process the complex nitrogenous bodies are broken down into simpler ammonia salts—which is a stage nearer to the formation of nitrates by nitrifying organisms—the latter being the only compounds of nitrogen which can be assimilated by plants. These fecal pits and urine kongs are a characteristic feature of the Chinese landscape and give rise to the “bouquet de Chine,” which is one of the many sacrifices the Chinese makes at the altar of agriculture. But, besides improving the fertilizing power of the manure, these fermenting pits to a large extent kill any pathogenic organisms that may be present. The fields of China sufficiently demonstrate the great value of human excrement as a fertilizer, producing fruit, flowers, and vegetables in the highest perfection. The military latrines are one of the very few things for which the local farmers are thankful to the armies, and which act as a source of revenue.

The Chinese solved the question of economic sanitation long ago. While the ultracivilized Occidental elaborates destructors for burning garbage at a financial loss and turns sewage into the sea—also frequently into the water he drinks—the Chinese converts each into a source of profit by using it for manure. He wastes nothing, while the sacred duty of agriculture is uppermost in his mind. And, in reality, recent bacteriological work has shown that fecal matter and house refuse are best destroyed by returning them to clean soil, where natural purification takes place. On the other hand, the typhoid bacillus, and to a less extent the cholera bacillus, can live and even multiply in polluted soil; that is, in soil holding a larger quantity of organic matter than it can elaborate into plant food. Both cholera and typhoid fever can infect vegetables if infected manure is directly applied to them. In China these two diseases are less frequently water-borne than derived from infected vegetable food. And in this connection it may be noted that typhoid fever is much more common among westerners resident in China than among those in the home lands. The greater prevalence of typhoid fever in China would appear at first sight a strong argument against the principle of returning refuse to the soil, but it is more probable that the fault lies with imperfect details. The native doctor does not disinfect the stools of typhoid fever cases, as he knows nothing about bacteria.

Inasmuch as the fecal matter is disposed of by natural principles, there is little real sewage in China, so that there is no need for a costly and elaborate system of drainage. The numerous waterways and the aggregation of the nonagricultural population near them make artificial sewers to a great extent unnecessary. In the great cities near the mouths of rivers and on the deltas, the numerous tide-flushed creeks perform the function of the sewer. These willow-

grown creeks, which add so much to the landscape of the Yangtze delta, when kept clean and deep, being flushed twice daily by the most economical and effective of all flushing apparatus, the tide, are excellent sewers and save much expense of artificial drainage. If maintained clean, the creeks and rivers are a perfectly legitimate and sanitary method of drainage, especially where there is little excremental sewage. And in the construction of these creeks the Chinese are masters of the art of irrigation. The motto of Li Ping, the great Szechuan engineer, inscribed 21 centuries ago in the temples among the hills above the Chengtu plain, "Dig deep the bed, keep the banks low," is as applicable to the whole of China as it was to the irrigation works of the Chengtu plain.

It is in the construction of house drains and street sewers in the cities that modern hygiene can be of use. Down the center of most streets in Chinese cities runs a trough of brick or mud covered with flagstones. Through the many places where the covering is imperfect can be seen a black fermenting mass, whose only chance of removal is afforded by a heavy fall of rain. The street sewers discharge into ditches which become the most noisome of septic tanks because of being blocked by garbage. In the cities, also, where agriculture is not the chief occupation of the inhabitants, garbage is allowed to accumulate. When divorced from agriculture, the principle of returning all refuse to mother earth does not flourish happily. Self-interest is the mainspring of good works, and in the cities it does not always pay to remove garbage to the agricultural districts; feces, however, always commands a good price and a ready sale, and its exploitation in most Chinese cities is a lucrative business.

The prevention of infectious diseases is the chief function of modern hygiene. Notwithstanding the great mass of recent pathological research, which has been the only real advance that medicine has made since the days of Hippocrates, Jennerian vaccination remains the type of all that is best in preventive medicine. The Chinese, however, anticipated Jenner, for they inoculated with smallpox as a protection against severe smallpox when our ancestors were painting themselves with woad. By comparison the Chinese were intellectual giants in those days. These Chinese have seen most of the great nations of antiquity in and out, and yet they remain a great people. Why has not China gone the way of the rest? The methods of living of the people must be essentially good.

The Chinese do not practice isolation of infectious disease. They have, however, been known to evacuate villages stricken with plague, and they frequently burn the clothing and bedding of persons dead of smallpox and cholera. The methods of modern hygiene, born of a true knowledge of the cause of infectious disease, notification, iso-

lation, and disinfection will come into play when the Chinese medical man ceases to be a mere drug vendor and becomes a true scientist. This will take a long time. The Chinese are Platonic rather than Socratic in their methods of reasoning, deductive rather than inductive, and have not that aspect of mentality developed which assimilates the natural sciences readily; with the result that in the Chinese armies no prophylaxis is given.

Unfortunately, the average modern Chinese soldier is without friends or families, and if he be killed no one is the wiser, and he may be thrown into a pit or river after the people have become tired of seeing the corpse about. But in civilian life the Chinese method of burial compares to advantage with that in America. In China the burial rites assume much importance. The coffin is of very thick wood mortised together and varnished, so as to be practically air- and water-tight. Prior to placing the body in it the coffin is half filled with lime. The coffin is rarely buried at once, but awaits prolonged funeral rites in a mortuary chapel or in the residence of the deceased. In the mortuaries the coffins can be seen in rows of hundreds and the freedom from disagreeable odor indicates how well the work has been done. The coffins are finally buried under a mound of earth or in a brick tomb, but always above the level of the surrounding land.

The absence of cremation among the Chinese is notable, considering its popularity in other Buddhist countries, such as India and Japan.

The materials used for clothing by the Chinese armies are mainly cotton cloth and padding. In hot weather the soldiers wear little more than drawers and usually carry fans. They wear small cotton caps the year around, with perhaps ear flaps in the winter. A rain umbrella is part of the soldier's kit. In the cold weather they increase the number of garments and wear an outer garment padded thickly with cotton wool, which is very warm and, at the same time, light though bulky. The children become twice their usual body size in winter and rarely suffer from cold. The cold-weather clothing is considerably lighter, warmer, and cheaper than European clothing and enables the Chinese to a large extent to do without artificial heat.

It is stated that in Europe alcoholism is the greatest obstacle to sanitary reform, and the death rate is more increased by this and its consequent misery in the course of 1 year than in 10 by all the infectious diseases. Drunkenness amongst the Chinese soldiers is practically nonexistent. Opium smoking is perhaps the equivalent in China of alcoholism, the sedative effects of opium being more in keeping with the Chinese character than the temporary mental and muscular excitement produced by alcohol, which is desired by Euro-

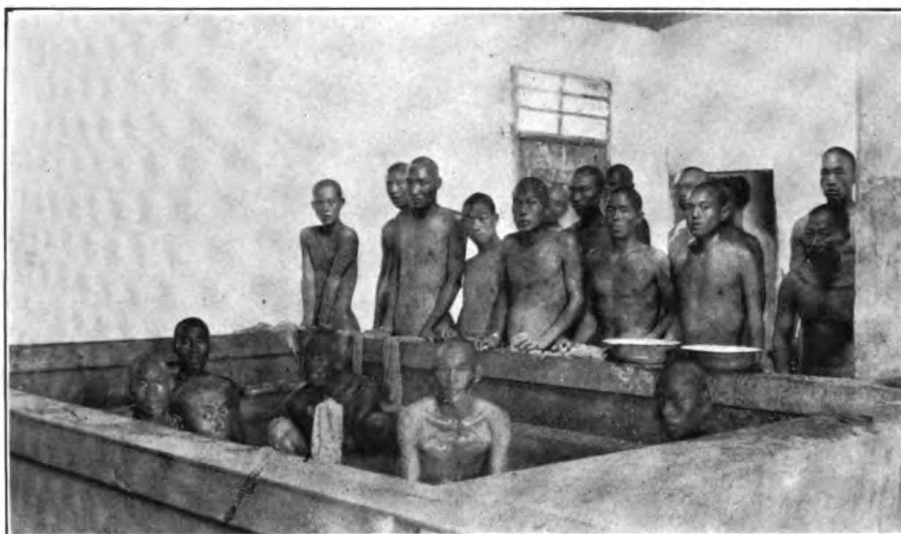


FIG. 6.—RAW RECRUITS CLEANING UP BEFORE GETTING INTO UNIFORM



FIG. 7.—ENTRAINED

806—1



FIG. 8.—MESS



FIG. 9.—THE COMPANY ENTERTAINER

806—2



FIG. 10.—A TYPICAL CHINESE SOLDIER



FIG. 11.—A CHINESE MORTUARY

806—3



FIG. 12.—SOLDIER, AGE 14. ONE MONTH AFTER
BEING WOUNDED. GANGRENE. STUMP COV-
ERED WITH LINEN.

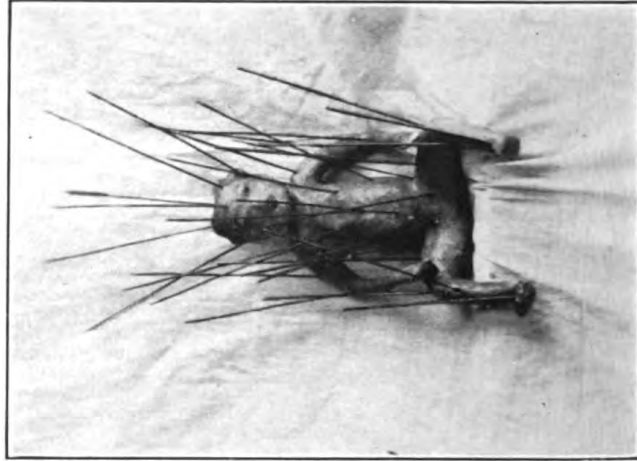


FIG. 13.—MANIKIN SHOWING SOME
ACUPUNCTURE POINTS USED BY
CHINESE SURGEONS.



FIG. 14.—THE "YANG" AND "YIN" DIAGRAM SEEN OVER THE DOOR
OF MANY CHINESE HOMES

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peans. But in comparison with alcohol the evil wrought by opium is trivial. While alcohol causes disease of most of the organs of the body and is one of the chief causes of insanity, opium produces scarcely any changes that can be recognized post-mortem. Alcoholism gives the greater number of total wrecks, physical and moral. Opium smoking gives the far greater proportion of intemperates, moral and physical.

Although drunkenness is rare among the Chinese soldiers, nevertheless, in the port towns, where inferior foreign liquor flows like water, there is a great deal of drunkenness and chronic alcoholic excess. Alcohol does not affect the Chinese quite as it does the foreigner, although no one who has given much ether or chloroform to the Chinese could fail to notice the frequency of the alcoholic reaction. In Shanghai this reaction is present in about 1 in 10 to 20 anesthetizations of men of the coolie or shopkeeper classes. It is as marked in these classes as in western countries. The reaction is characteristic and almost pathognomonic of the alcoholic habitué. Drunkenness of the "boozy" and blur-eyed type is often seen among the young bloods of Shanghai, who do much feasting, and are wont to wind up the same with a game of "hwah-joen," a drinking game. The Chinese vocabulary is full of words about drinking to excess and drunkards and all that pertains thereto.

No discussion of military medicine can be made without going into the matter of prostitution and venereal diseases. Prostitution is known as the oldest profession in the world, and, according to Chinese tradition, the first prostitute was Hung Yai, who lived in the mythical period of the three emperors. In ancient times the Chinese characters "Chi," prostitute, and "Chi," art, were identical in meaning. A girl who was proficient in dancing and music was called "Chi." The earliest report of prostitutes, however, was made in the Chow dynasty (B. C. 650). It is recorded that Kwan Chung established 300 Lu for the convenience of merchants. A "Lu" is a district, still to be found in many modern cities, to which prostitutes confine themselves in carrying on their business. In the reign of Han Wu (B. C. 40) prostitutes were supplied to the camps for unmarried soldiers, and in the Tang and Sung dynasties brothels were licensed and given the name of "Chiao Fang."

The courtesans of old occupied a somewhat higher social position than is held now by their successors, for many were educated and highly accomplished. Men sought their society not solely for sexual gratification, but for their pleasant company, their lively conversation, ready wit, and for other reasons. Distinguished poets and writers, like Li Pah, Tu Fu, Su Tung Po, Pak Loh Tien, etc., were friendly with this class and wrote poems for them.

But prostitution, even in the most favorable circumstances, has always been discountenanced and condemned in China. According to the Chinese, of the four vices it stands first on the list, the other three being drinking, gambling, and opium smoking. Prostitutes are branded as social outcasts. They are spoken of as "rotten or stinking goods." "You are a harlot," is the worst epithet one woman can hurl at another. In trade advertisements such passages as this are frequently seen: "Any person who forges this trade-mark is a robber if a man, and a harlot if a woman." The sages ever exhorted men to keep away from the social evil. Confucius cautioned youths to be particularly careful of indulgence of this nature. Mencius taught that the best means to nourish the heart is to have few desires. A significant couplet by Chang Ma Lin is: "If you defile another's wife or daughter, your own wife or daughter will be similarly defiled." Slavery is responsible for 80 per cent of the prostitution of China to-day. Owing to the dire poverty of the masses and the utter disregard for daughters by many Chinese parents, slave girls are bought and sold everywhere. Generally, they are not sold directly to a house of ill fame. They are bought first as servants, but after a time are sent to this ultimate destination. The owner of a brothel usually buys a number of young girls, and then rears and trains them until they are old enough to follow the profession. To supply the demand, girls are often kidnapped for this purpose.

The insignificant compensation awarded to female labor drives many girls and women into harlotry. Chinese women are not taught the practical business matters of life, and the existent social regulations unreasonably limit their industrial spheres. In consequence of this, few are able to earn enough to supply their wants, and when hard times come they have no other resources for subsistence.

Another important cause of prostitution is ignorance. The people do not realize the prevalence and significance of this traffic. It is tolerated because many believe that it is a necessary evil and that it can not be eradicated. Some hold that it is an important factor in increasing the trade of a locality, hence merchants utilize a brothel as a meeting place for business. The notion is also current that a young man has "to sow his wild oats" in order to be steadier. Of its physical effects on individuals, on their offspring, and on society little is known by the people. Statistics are not available as to the percentage of the population suffering from venereal diseases. However, all doctors in China agree that the number of such patients is astonishingly large and that it is rapidly increasing.

Again, parents or guardians not only are unaware of the moral dangers which beset their daughters or wards, but often exclaim incredulously that such dangers do not exist. Even the daughter or

ward herself, when informed of the great risks she runs, may scorn the idea that she is not able to look after herself, and may resent what she considers an unjust estimation of her moral character. The reason for this ignorance is easy to understand, for the methods of the procurers and procuresses are so subtle and ingenious that no one—unless closely associated with the traffic—knows exactly how they do their work. Besides, if a girl has fallen a victim to the evil, her relatives naturally use all their influence to hush the whole matter up, and thereby they destroy one of the most effective means—publicity—of checking the traffic.

An idea of the extent of this evil may be gathered from the revelations in Shanghai in recent years of organized gangs, the sole object of which is to seduce innocent women and blackmail them. They are known by the name of Tsah Pah Tang. Their favorite recruiting grounds are the theaters, tea houses, amusement parks, and other public places. The hotels are notorious hotbeds for immoral purposes. In fact, the ramifications of this traffic are found in all kinds of trades and professions. Many of the hotel boys, the theater ushers, the waiters in the restaurants, the flower girls, newspaper sellers, mafoos, maid servants, and even ricksha coolies are aiding and abetting this trade. The most dangerous of all, perhaps, are the women hair dressers and the sellers of jewelry, because they have easy access to the household and can exercise their influence freely.

Of the indirect causes of prostitution, mention may be made of the unrestricted sale of obscene pictures, magazines, and novels. The output of these articles has greatly increased during the last few years. The native newspapers are responsible for suggestive advertisements which are found in glaring letters in every paper. It helps the sale of patent medicines and the practice of quackery. With the introduction of "606" and such preparations, the condition has been rendered worse. It has given a false security to the Chinese people, making them more reckless. Consequently, the number of patients with venereal diseases is increasing instead of decreasing.

The Chinese prostitute is commonly spoken of as a "sing-song girl"; although she is known by various names in Chinese, the more fashionable designations not being equivalent to "sing-song," but to "story-teller" or "entertainer." The term "Shu Yu" is used to denote the residences of these so-called "narrators of books" or entertainers. The places of public entertainment where they display their art are called "Shu Lou." This class of prostitutes in their residence sell their beauty and in the public places of entertainment they sell their skill. The two matters are kept quite distinct from each other. That the "sing-song" girls practise prostitution in their residences is well known, but they themselves say they only sell their

skill, and will not admit anything further. Their apparent income (from singing) is small, yet they are able to display great extravagance and may be seen with opium pipes or water-tobacco pipes worth hundreds of dollars.

In the middle of the last century the "sing-song" girls of the Chinese city of Shanghai nearly all migrated to the international settlement, known as the most cosmopolitan city in the world, and the most wicked. At that time there were from 200 to 300 of these women in the city. As they became more numerous their price declined, patrons were of a poorer class, and eventually the "sing-song" girls joined the Ch'ang San class of prostitutes, and the name Shu Yu is now chiefly one of past history.

The term "Ch'ang San" is the name of a domino used in playing mah-jongg; it has three dots doubled. In past days a certain class of prostitutes received \$3 for their services in persuading guests to drink, and \$3 more for accommodating the guest for the night. These fixed amounts resembled the "double three" of the domino, so this class of girls became known as the Ch'ang San. At one time they used to be Shanghai's highest grade prostitutes. When the name became common, some noted women again introduced the name Shu Yu to differentiate between the high and low classes, selecting for the former those who could gain a living by their skill. The distinction being made, some of the patrons naturally preferred the Shu Yu and lightly regarded the Ch'ang San.

When the Ch'ang San moved into the International Settlement they did not number 500. Subsequently, when the Shu Yu was no longer a novelty and men began to tire of it, the Ch'ang San used their best endeavors to better their position; they abolished the "double three" system and followed much the same customs as the Shu Yu, but made themselves very accessible to pleasure seekers; thus the "sing-song" girls of the Shu Yu were displaced by the Ch'ang San, and this class then naturally became the highest class of prostitutes. For a time the name "story-teller" was applied to them, but as they seldom appeared at the entertainment halls, or if they did, they only sang a few songs and did not tell stories, they gradually ceased to be called by this name. Their ways of getting money from the guests were many; besides what was paid for encouraging drinking and for the accommodation of the night, there were expenses for a feast; these feasts cost from \$2 to \$10, and the brothel's share was about one-third. Then there were presents or tips amounting to about \$4; it was reckoned that half of this was to go to the instrumentalists and accompanists, and half to the cook and servants; but in reality the greater part of it went to the brothel.

The receipts of the Ch'ang San were four kinds. 1. The price for going to a place when invited. 2. The share of the feast expenses. 3. Receipts from the games at cards or mah-jongg. 4. Presents and tips. The first of these was \$1; the feast would bring in \$5, and games \$3 or more. While under this plan nothing was openly charged for spending the night, yet, in fact, what with one thing and another this item cost more than the previously mentioned four kinds put together, as one night would cost the pleasure-seeker from \$30 to \$50. The gambling receipts are now more, as many men connected with foreign firms, and returned students, like to play poker for high stakes, and it is customary to reckon \$12 as the girl's share.

There are three kinds of Ch'ang San prostitutes—the free, the half-free, and those not free at all. The first kind enter the brothel of their own accord, pay all expenses from their earnings, and are in everything their own mistresses. The second kind have mortgaged themselves to the brothel for a term of years, after which they revert to their previous condition; in this case some control is exercised over them by the house. Those not free have been sold absolutely to the brothel and are regarded as chattels to be dealt with as their owners please; they have a very bitter lot. At present most of the Ch'ang San belong to the second kind; those of the third kind are fewer, while those of the first kind are not more than 1 in 20 of the whole. There are also some mothers who put their own daughters into prostitution, but these are few.

There are over 1,200 Ch'ang San in Shanghai alone. The numbers of those engaged in brothels in various capacities is quite as large, as every prostitute of the Ch'ang San class has one or more attendants of much the same moral character, so the number just given might safely be doubled. In an estimation of the number concerned there is also to be taken into account the mistresses and other women, the bookkeepers, cooks, and servants, runners, ricksha pullers, etc.

The "Yee Er" is another class. Yee Er is the name of a domino, the "one-two." In the early days of the last century there was at Shanghai a class of prostitutes who received 1,000 cash as tea money and 2,000 cash for assisting in the wine drinking. This reminded people of the "one-two" domino, so the name Yee Er was popularly applied to these girls. This class at one time ranked about the same as the Ch'ang San, but as the last named advanced to the place of Shu Yu, the Yee Er were left behind and are now regarded as a lower class. The receipts from their patrons were 1,000 cash for tea, 2,000 cash for the wine drinking, 5,000 to 10,000 for the feast, and 2,000 for the night. This was afterwards changed, so that while new acquaintances paid for tea, regular patrons paid nothing; the

feast cost \$3 or \$4, and there was \$6 for cards or mah-jongg. For the accommodation for the night, newcomers, or those who had not shared in the drinking or playing, paid \$3, while old friends just gave \$1 as a present. As lower grades became more popular, the Yee Er lost some of their business, as their patrons were limited to a few of certain classes. There are about 500 Yee Er in Shanghai.

The life of the Yee Er is a hard one; in clothing, housing, and food the conditions are unsatisfactory. Being of a lower class, they wear poor clothing and their food is very poor; the houses they are in may be passable on the outside, but they are extremely bad inside. Except for those who have night guests, they are packed five or six in a small room without as much comfort as pigs or dogs.

The Yeh Chi, "Pheasants," or "Wild birds," are a class of prostitutes who go about from place to place like flying birds, and as their gaudy clothing resembles the pheasant, the name "Yeh Chi" has been given to them. Formerly they operated in the Shanghai Chinese city, but they have gradually invaded the Settlement and may be found anywhere. Their number is greater than that of any other class of prostitutes; they are of low class and are entirely dependent on intercourse for a living. They are the greatest disseminators of venereal diseases and, in general, live like animals. This is the class that caters mostly to the Chinese soldiers and is the type that follows the camps.

As the number of Yeh Chi increased, they have become of different grades; besides those who stand on the sides of the streets, there are those who go into tea shops or wander about the streets seeking trade, so that their customers are gathered in from all classes. The practice of seizing hold of men is followed by some; others use their arts to get men to go with them. Bartering takes place on the streets, and the girls will go wherever the patrons want.

Streetwalking begins about 7 in the evening and goes on till 11 or 12. These girls are known as "night-wandering spirits." An investigation made in Shanghai shows that there are at least 6,000 of these Yeh Chi within the city limits.

The lower class of Yeh Chi consists practically entirely of those who have been sold into the life. There are several alleys in the center of the Shanghai Settlement, known as the "trenches," in which several hundred of these prostitutes ply their trade. Almost any evening they may be seen standing near their houses or prowling on the street, and after dark they may be distinctly heard calling out their prices as the coolies pass by—"20 cents" or "30 cents," according to the market, and to judge by appearances business is usually excellent. No matter what the weather—hot or cold, rain, frost, or snow—when evening comes they must stand in groups and call out to

men, and on the least response they must take hold of them and cajole them to respond. If not successful, the girls are beaten. In the cold weather their clothing is insufficient, but as they dare not go back without a patron they have to stand out shivering in the weather. If they secure a patron they have a little respite, but if not, they know what to expect from their mistress, and the poor girls can only prepare for a beating. These lower grades of girls have poor food and no proper sleeping accommodation. Among this type there are very many girls of 13 and 14 years of age; and it seems that brothels are most anxious to get the younger girls.

The name "P'eng Ho Tai" is given to a class of prostitutes who hang out signs at their doors, giving their names, and at their houses there is card playing and drinking, with payment for the same similar to the Ch'ang San. When they go out by invitation, the charge is \$1. Some of them have no fixed charges for the night's accommodation, but those connected with the smaller places require at least \$10. There are about 40 houses, with about 110 inmates in this class.

The Pia Ko Tang are the "White Pigeon Gang." Pigeons only know their old homes, and if taken elsewhere they take the first opportunity to return. Through China there are men who sell their own wives to other men, and before long the women escape, leaving the purchaser without the woman or the money he paid for her. Because of some resemblance to the habit of the homing pigeon this class of woman is known as the "white pigeon," and as they work together the word "gang" has been added. This trick is usually worked by men kidnappers, who by various devices kidnap a woman and then use their power and also their art to gain her affection, and when they know she will return they sell her to some foolish rich man as a way of relieving him of some of his money. Various schemes are used. The man will sometimes himself sell the woman to the victim and soon help her to escape with some valuables; at other times some one else will take the woman, and after a few days the pimp will appear to claim her, asserting she has been kidnapped, and talking about going to law, and so extorting money from the victim as well as taking the woman away. Another plan is for the woman to entice the victim to her house, and while in the midst of his infatuation he is seized and charged with adultery and made to pay heavily to settle the matter.

The Hwa Yen Chien is a lower class of prostitutes. Disease is so rife amongst them that almost every one of them may be depended on to have venereal disease. In Shanghai there are over 1,000 of these girls. Some have been sold to the brothels because of poverty, others have been kidnapped or in other ways victimized. They are the slaves of the mistresses and their earnings are taken by them.

By day or by night these girls have to be on the lookout to invite patrons, and on receipt of 20 cents they have to submit themselves. If they have a guest for the night they may get a little rest, but otherwise there is little or no sleep for them. The mistresses treat them harshly. If they do anything a little displeasing, anger is vented upon them, and if they do not secure many men they are beaten and cursed. They have to seek business in all kinds of weather, and in all their spare time they are forced to do needlework.

The Hwa Yen Chien might well be called the lowest class of prostitutes, and yet there is a lower class still, a most deplorable set, the "Nailing Shed" prostitutes. There are in Shanghai about a half hundred of this class, who have sunk below the other classes. They are so full of disease as to be outcast, or they are of evil disposition, or they have been sold specially out of spite by hard mistresses. The price of their service used to be 5 cents, but they now charge 10 cents; and yet they have so many visitors of the lower classes that they may make \$2 for the day and night. If they make less than this their mistresses may whip them unmercifully.

The Han Shui Mei, "Salt-Water Sisters," are Cantonese prostitutes who may be found in every Chinese port. In Shanghai there are over 250 of this type. Most of these girls speak a little English, and cater to foreign sailors and soldiers. Others are patronized by Cantonese. These girls dress differently from the usual Chinese courtesan; they do not have the gaudy finery, and often they do not wear stockings, and at times are bare-footed. They are more hygienic than some of the others, partly because of the Cantonese love of cleanliness and partly because they wish to attract foreigners.

Homosexual practices are common amongst Chinese and especially amongst the soldiers. Then also in almost every Chinese city there are places which are known as "T'ai Chi" where men and women are introduced to one another for illicit intercourse. Some of these are camouflaged as photographers' shops. A place is rented and arrangements made with a few girls, and the thing is begun quite easily. At first there are some restrictions, and only those who are known can enter, but in course of time anyone can go. The higher grade of T'ai Chi require \$10 to \$15 for introducing a couple to each other and the next grade want \$5 to \$8; of this amount two-thirds go to the girl and the rest to the master of the shop or house. Most of the girls who go to these places have an infatuation for some particular man, but because of family difficulties they can not get their desire, so they use this means to gain their end. At first they only have relations with the one to whom they are specially attracted, but the proprietor of the house knows how to take advantage of their weakness and brings pressure to bear, with the result that after one visit other visits are paid, until the

girl becomes a regular prostitute. Some girls go to these places from economic reasons or family or marriage difficulties; others are led by passion and seek introductions with the idea of gratifying desire and getting a little extra money at the same time.

In the International Settlement of Shanghai there was, until recently, municipal medical examination of a small number of the Chinese prostitutes. Because of a system of fines for nonattendance for weekly examination, this was practically compulsory. It was discontinued on vote of the ratepayers' meeting in 1920. In Hangchow there is a small amount of municipal treatment for those affected by venereal diseases. At another Chinese port, also, medical examination was attempted but given up. The government regulations, which are operative in Peking, require that as soon as diseased, a prostitute must be sent to the hospital and the police notified. But so far as China as a whole is concerned, there is no compulsory medical examination of prostitutes, and almost no effort to treat or prevent venereal diseases. As to the actual existence of venereal disease in China little is known. One statistical study states that 39 per cent of the population has syphilis, while in another series about 50 per cent could be clinically diagnosed.

As has been stated before, the Chinese Army makes no provision for prophylaxis and certainly gives no treatment for venereal infection. If a soldier is treated, he has to seek outside aid, and in most cases goes without. Although the Chinese are usually spoken of as the most insanitary of individuals, he would be a poor observer who would hold that Chinese sanitation is not better than that of mediæval Europe. Were China imbued with the true scientific spirit she would become perhaps a model of sanitation, because the methods of living of the people are essentially good.

The prolonged national life of the Chinese and their great population are an unanswerable argument indicating sound sanitation. Pestilence rather than war has been the cause of the disappearance of the nations of antiquity, whose origin was synchronous with that of the Chinese. At the present day the thrifty millions of China overflow their own country and compete so successfully with the British and Americans that laws have been made in America and Australia forbidding the immigration of Chinese.

From a hygienic aspect many of the modes of living of the Chinese are better than those of modern Europeans; for example, in the matters of food; disposal of refuse for the benefit of agriculture; clothing; and in the comparative absence of excesses.

The two ancient Chinese sanitary principles, restraint of the appetites and cleanliness in house and person, are the shortest and most comprehensive summary possible of modern public health rules, including as they do most of what is essential in modern hygiene.

Antiquity in national life is good because it allows evolution to have full development. In social etiquette, for example, ceremonials have been gradually perfected through long periods of time, so that their modes of social intercourse are the most punctilious and refined. In general life it is admitted by those who know that the Chinese gentleman is the most polite in the world. In a somewhat similar manner it is conceivable that the modes of living for the promotion of health have undergone evolution.

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ABDOMINAL WOUNDS AND INJURIES¹

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Injuries of the abdomen present some of our most difficult problems in diagnosis and decision as to treatment. It is impossible to insist too strongly on the importance of the time element in these cases, for many lives are lost by delaying until diagnosis is complete and definite evidence of severe internal hemorrhage or peritonitis is present. The prognosis depends not only on the nature and the number of the visceral lesions but also on the time at which the operation is performed. Every hour is precious.

One must not lose sight of the fact that any of the abdominal organs may be ruptured without any external evidence of injury. Ruptures of the hollow organs are followed by peritonitis, while rupture of the solid organs gives rise to severe hemorrhage. In either case early diagnosis and rapid intervention are essential. Immediately after the injury, while the patient is severely shocked, it may not be possible to determine whether or not laparotomy is required, but it is advisable to start preparing for operation and by the time the operating room is fully rigged it will usually be possible to decide for or against operative interference.

Cases without open wounds present the greatest difficulty, and here a knowledge of the manner in which the injury was inflicted is valuable, whether by a blow, by a fall, or by a heavy vehicle passing over the abdomen. Other important details are the character of the abdominal wall, whether muscular, flabby, or fat; the stomach, whether full from a recent meal or empty; the spleen, whether enlarged by disease or not; the bladder, whether distended or empty.

¹ A lecture delivered in the course in surgery at the U. S. Naval Medical School.

A knowledge of the frequency with which various organs are injured is often helpful in determining the probabilities. The intestine, especially the small intestine, is most often injured; then come the stomach, kidney, liver, spleen, bladder, and pancreas in order of frequency.

Shock is present to some degree in all grave abdominal injuries. It may be severe, becoming progressively deeper, or it may be only transitory, possibly to be followed by the secondary shock due to severe internal hemorrhage. Shock is manifested by unconsciousness with rapid, weak pulse, pallor, and cold, moist skin. Vomiting and involuntary passage of urine or feces may occur as consciousness returns. The patient is listless, anxious, and complains of pain in the abdomen. Treatment of the shock consists of rest with the head low, external heat, and stimulation if required. Remove the clothing; examine the abdomen for wounds or evidence of injury; give hot coffee by rectum, and prepare for administration of fluids hypodermically or intravenously. Adrenalin, camphorated oil, or other stimulant may be given hypodermically. Take the blood pressure, white blood count, temperature, and pulse periodically.

Abdominal shock does not last very long unless there are severe complications. H. W. Carson says that if, after two hours, the condition of the patient is not improving, some deep-lying injury may well be suspected. Evidence of this is obtained from the facial appearance, the pulse, respiration, blood pressure, temperature, and blood count. If the patient recovers consciousness, is cheerful, and has a good pulse; if the abdominal pain and rigidity disappear; if he is able to pass urine and flatus and has no vomiting, then rest in bed with careful watching will be indicated.

Operation will be necessary if shock persists after a period of treatment of two hours at the most. In such cases there are increasing weakness and frequency of the pulse, also beginning distention of the abdomen, with tenderness and rigidity of its wall. There is sub-normal temperature and the patient is thirsty, restless, and anxious, with labored respiration. Immediate operation should be the rule in such cases.

Certain confirmatory symptoms may be present, but one must not wait for their development, because every hour is precious. Vomiting, especially of blood, suggests injury to the stomach or upper intestine and lavage should not be attempted. A wound which shows severe, continued hemorrhage requires operation. A fecal odor or bile-stained fluid coming from a wound indicates intestinal injury and requires operation. Rigidity and pain, especially if localized near the point of injury and gradually extending, indicate a severe injury. Bloody urine or feces suggests injury to the organs from which they come. Shifting dullness in the flanks, decrease in the red

cells with increase in the white cells, are evidences of internal hemorrhage. Progressive distention of the abdomen, at first limited to the area of injury but later spreading, is evidence of severe injury. Resonance over the liver is also a valuable sign if it appears soon after the injury and before there is general distention.

The above remarks apply to abdominal injuries in general. Lesions of special structures will now be considered.

WOUNDS AND INJURIES OF THE ABDOMINAL WALL

Contusions may be local or diffuse and may have associated injuries of the abdominal viscera. In this possibility of involvement of other structures lies our chief interest in contusions. Moderate blows may produce only ecchymosis or the formation of a hematoma. Heavier blows may cause rupture of muscle fibers or the whole muscle. The latter occurs most often in the recti, usually in athletes, especially wrestlers. Rupture of several muscle fibers is probably the commonest cause of "Charley horse." I have seen a large hematoma within the sheath of the external oblique muscle following a blow on the abdomen of a hemophiliac. Rest and perhaps adhesive strapping are sufficient for the milder contusions, but complete rupture of the rectus should be repaired. Subcutaneous rupture of the abdominal wall may result in hernia which will require repair.

Penetrating wounds may be small, such as stab or gunshot wounds, or they may be large enough to allow evisceration. With small stab wounds the first question to be settled is whether or not they penetrate the peritoneum. If feces, flatus, urine, or bile-stained fluid escapes from the wound there will be no doubt of its seriousness; but this is rarely the case. If profuse hemorrhage continues it is probable that the deeper structures have been injured. "In the abdomen there are no insignificant wounds." (Lejars.)

The only safe way to determine whether or not it is a dangerous wound is to enlarge and explore it. After the patient has reached the hospital and has recovered from his shock the wound should be extended and each layer of the wall examined to determine the amount of injury. If it does not penetrate the peritoneum, disinfect the wound, repair each layer carefully, stop all bleeding, and close with drainage. Thus we avoid hemorrhage, sepsis, and later hernia formation. If there be penetration through the peritoneum, an exploratory laparotomy is usually necessary and it will frequently be advisable to repair the wound and make a new incision which will give better access to the organs which are probably injured.

Large lacerated wounds which do not entirely penetrate the abdominal wall will require disinfection and hemostasis, followed by careful repair of the severed tissues, to avoid hernia. Large lacera-

tions which involve the whole thickness of the wall may show more or less complete evisceration. They may be due to cutting instruments, horns of cattle, or machinery accidents. Frequently they have so much associated injury to the viscera that death rapidly ensues. If there be a considerable degree of evisceration, one need not wait for subsidence of the shock, because the evisceration is a large factor in producing it. As soon as the patient reaches the sick bay or hospital clean the wound and the protruding viscera with plenty of warm, normal salt solution; repair any wounds of the viscera; carefully repair the tissues of the abdominal wall, leaving drainage into the peritoneum.

Gunshot wounds of war must be handled differently from those of civil life. The military aspect will be covered at another time and we will now confine ourselves to consideration of the wounds of peaceful times, such as the present. Gunshot wounds are usually divided into three classes: (a) Those which are evidently serious, (b) those of doubtful severity, and (c) those which are probably simple.

Serious wounds may be characterized by escape of feces, urine, flatus, bile-stained fluid, or profuse hemorrhage from the wound, though these are very frequently absent. Estimating the probability of severe injury by the direction of the missile is not reliable, because the bullet may be deflected or deformed by striking a bone. Multiple lesions are common. Watch for vomiting and symptoms indicating shock and internal hemorrhage. It is commonly stated that if the patient is able to pass flatus and urine there is no perforation of any important hollow viscus. Early transfusion or intravenous saline may be useful. Delay operation until the pulse is improving and the blood pressure is above 80. It is by no means the rule that all these cases should be operated upon. Some will recover without operation while others will die whether operated upon or not. Careful study of the pulse rate, blood pressure, facial expression, abdominal rigidity, and distention must be the basis for the decision. If the case be one which will probably be benefited by operation, it is usually safe to spend two or three hours studying it before operating, unless there are special indications for earlier action.

Wounds of doubtful severity usually have a good pulse and the abdomen shows no distention or extreme rigidity. The blood pressure is above 80, and there is no evidence of injury to any particular organ. When the shock passes off, enlarge and explore the wound. If it does not penetrate the peritoneum, repair the wound carefully, leaving in a drain. If it does penetrate the peritoneum, do an exploratory laparotomy at once, and a large median incision is usually advisable.

Wounds which are probably simple are characterized by rapid return of the blood pressure and pulse rate to normal, passage of

flatus and urine, with absence of abdominal tenderness and rigidity. A simple dressing is usually sufficient and search for the missile may be deferred.

All patients with gunshot wounds should receive a prophylactic dose of tetanus antitoxin.

OPERATION WHEN EXACT DIAGNOSIS IS NOT POSSIBLE

In most cases of severe abdominal injury one can not determine, in advance of the operation, exactly what organs are injured or to what extent. So it is important to watch for clues as the operation proceeds. Arrangements should be made to give transfusion or intravenous saline during the operation, as needed. The incision should be so planned as to give generous exposure. A mid-line incision below the umbilicus gives access to most of the organs commonly injured and can be extended upward when necessary. A small opening may be made through the peritoneum at first, and, if the lesion is not immediately found, the cut can be rapidly enlarged. If a probable diagnosis has been made, the incision should be chosen which will give the best exposure of the organ which is probably injured.

As soon as the peritoneum is opened, free blood or gas may appear, in either case a valuable clue. If there be much blood, look over the omentum for bleeding points and if none be found palpate the spleen, liver, and kidneys in rapid succession. If one of these is the source of the bleeding, it can be controlled by compression of the pedicle. If the location of the injury is still obscure, overhaul the mesentery, then the stomach, duodenum, pancreas, and bladder. Then search the posterior parietal peritoneum for openings through which blood may be escaping from retroperitoneal structures. Remember that if the patient is greatly exsanguinated his blood pressure may fall so low that bleeding will stop, only to start again as his condition improves and the blood pressure rises. An adherent clot may indicate the source of bleeding, which has temporarily ceased. If there be much free blood in the peritoneum it may be collected aseptically, citrated, and then injected into the patient's vein. This will not be desirable if the blood is contaminated with effused urine or bile.

Free gas within the peritoneum indicates rupture of the intestine, and, as the small gut is more often injured than the large, it should be examined first. Start at the ileocecal valve and overhaul it rapidly. As the loops are examined the assistant should return them to the abdomen or cover them with hot towels. Gas escaping from the large intestine is likely to have a fecal odor and to be accompanied by brownish fluid, while that from the upper part of the small intestine is usually odorless and accompanied by bile-stained fluid.

Free bile will suggest immediate examination of the gall bladder, bile ducts, and liver, while free urine will direct us at once to the bladder and ureters.

WOUNDS AND INJURIES OF THE STOMACH

Because of its anatomical relations, being surrounded by the liver, diaphragm, pancreas, colon, and spleen, it is rare to encounter uncomplicated wounds of the stomach. Severe injuries are likely to be accompanied by other visceral lesions serious enough to be fatal before surgical treatment is available. The high mortality of wounds in this region is due principally to hemorrhage. The stomach is rarely involved in stab wounds but often in gunshot wounds. Because of its mobility and its thick wall, it is less frequently injured than the intestine.

The most important symptoms of penetrating wounds of the stomach are shock, hemorrhage, vomiting of blood, and escape of stomach contents from the wound, but, as a rule, the predominating symptoms are those of severe internal hemorrhage. On opening the peritoneum, gastric contents may be found outside the stomach, for this organ is more often injured during gastric digestion than when it is empty.

Small penetrating wounds, such as those made by bullets or knives, may be closed by a purse string or interrupted Lembert sutures, usually in two layers. One must not forget that such wounds frequently involve the posterior wall as well as the anterior. Many lives have been lost because the hole in the posterior wall was overlooked and caused a fatal peritonitis. Examine the posterior wall through an opening in the transverse mesocolon or the gastrocolic omentum or else enlarge the opening in the anterior wall so that the stomach can be examined and repaired from within.

Ruptures may be complete or they may involve only a part of the layers of the stomach wall. If incomplete ruptures are overlooked, the untorn mucosa or serosa is likely to undergo necrosis and digestion, leading to perforation and a fatal peritonitis. Ruptures should be completely exposed; all hemorrhage should be controlled and the edges should be freshened, if necessary, and carefully sutured.

Injury of a large gastric vessel may produce necrosis of the part of the stomach wall supplied by it. It is worth while to spend a few minutes studying the reaction of the tissue to hot packs in doubtful cases. If the viability of the tissue be doubtful, it is well to leave in a drainage tube and be prepared to reoperate at once if peritonitis develops. It is seldom advisable to do an elaborate resection at the time of the emergency operation, and the rich anastomosis of the

gastric vessels reduces the probability of necrosis. Wounds near the cardia or pylorus may produce stenosis after healing, so gastroenterostomy or some other method to prevent the possible stenosis may be advisable. Suture lines should be reinforced with omentum or fascia. Pelvic drainage is necessary if there be much soiling of the peritoneum or if considerable time has passed since the injury.

WOUNDS AND INJURIES OF THE INTESTINES

The fixed loops of intestine, which can not slide away from the impacting force, are more often injured than those which are freely movable. Thus the first part of the jejunum and the lower loops of the ileum are most frequently injured. In the large intestine, the splenic flexure is most firmly fixed, but it is so well protected by the overlying ribs and liver that it is injured less frequently than the cecum and ascending colon. Ulcers of the intestines may rupture as a result of trauma, and these are mostly in the lower ileum. Pneumatic rupture, caused by placing the muzzle of a compressed-air hose close to the anus, as a practical joke, usually occurs in the rectum or sigmoid. Injuries of the duodenum and the retroperitoneal portions of the large intestine are especially serious. They are frequently overlooked at the time of operation, even though a methodical search be made. If found and repaired, the lack of a serous covering greatly reduces the chance of satisfactory healing after repair. Many of them go unrecognized until a retroperitoneal abscess has formed. Duodenal fistula may form and this will cause rapid wasting and perhaps death from inanition unless it be repaired at once.

In the majority of cases there are multiple injuries, so one must search the entire intestine. The most common site of the lesion is at the anti-mesenteric border. The types of lesions are numerous—small perforations, large ruptures, complete or incomplete tears, contusions, detachment of the mesentery, or injury of the mesenteric vessels. Small perforations may cause no leakage, because protrusion of the mucous membrane plugs the opening. Mesenteric injury or detachment may produce serious hemorrhage or may lead to gangrene and a fatal peritonitis several days after the injury. An incomplete tear, extending only part way through the intestinal wall, is likely to be followed by necrosis and complete perforation several days after the injury. Mild contusions produce an ecchymosis and local paralysis of the bowel which soon disappear, but more severe contusions produce purplish areas in the intestinal wall which do not improve in appearance when moist heat is applied. These areas undergo gangrene, producing perforative peritonitis several days later. I once lost a patient through my ignorance of this fact.

The symptoms of intestinal injury may be those of hemorrhage or those of peritonitis, according to the type of lesion. Bloody stools are occasionally observed and, when present, point strongly toward intestinal injury. Vomiting is an inconstant symptom in the early stages but becomes more prominent as peritonitis develops. Gas escaping from a ruptured intestine will find its way to the highest part of the abdomen, where it will produce tympany that shifts with a change in the position of the patient. Absence of liver dullness is a valuable sign if it appears early, before the general distention of peritonitis which develops 12 to 24 hours after injury. Inability to pass flatus is strong evidence of intestinal injury. Rigidity, pain on deep inspiration, and tenderness are nearly always present and are likely to be more marked if there be escape of intestinal contents than if there be hemorrhage alone.

Operation should be done as early as possible, for the prognosis is extremely bad if the condition is not diagnosed and the lesions repaired within 12 hours after injury. As soon as the peritoneum is opened, sponge out or aspirate the escaped intestinal contents. If hemorrhage be profuse, attend to that first. If the injured part be not at once found, start at the ileocecal valve and overhaul the intestine. As the perforations are found, mark them by clamps or other means until the whole small intestine has been examined. This is important because multiple lesions in adjacent loops are common. Some recommend immediate complete evisceration, so that all the work can be done outside the abdomen with the intestines protected by hot towels. Small openings should be sutured transversely so that the caliber of the gut will not be too greatly reduced. The type of suture is optional with the individual, but if the operator has, by practice, gained confidence in his ability to make a water-tight closure with a single-layer suture, that type is better. There is a tendency to do too much sewing rather than too little; the time element is important and the single-layer suture does not cause so much narrowing of the lumen of the gut.

Injuries to the main mesenteric vessels or stripping of the mesentery from the intestine will interfere with the circulation, leading to gangrene, so resection of the segment is necessary. Incomplete lacerations should be fully opened up and search made for bleeding vessels. The tears may be sewed if this can be securely done without reducing the lumen of the gut more than one-third; otherwise it is best to resect. Contused areas which do not improve in color after the application of moist heat should be resected or invaginated, according to their size. If their future is somewhat doubtful, sew them against the parietal peritoneum so that, if gangrene and perforation do occur, one can reoperate immediately and know exactly

where to find the lesion. If there are several injuries within a short distance, it is better to resect the whole segment. Time is saved and the danger of leakage is less. The repaired parts should be covered over with omentum, whenever possible, to give added security against leakage.

The type of anastomosis to be used is a matter of individual choice. The end-to-end is more physiologically correct and normal peristalsis is more quickly restored. The Murphy button has fallen from favor since skill in intestinal suture has become more general, but for the occasional operator, as most Navy surgeons are, it may well be a real life-saver. In the hands of the average medical officer the chances of a successful anastomosis are far greater with the Murphy button than by any other method.

If the operation has been long delayed, or if the patient is in very poor condition, so that the time element is most important, do not wait to repair or resect the injured gut. Simply bring it outside the abdomen, insert a pelvic drain, and close the incision. A fecal fistula results which can be repaired when conditions are more favorable.

WOUNDS AND INJURIES OF THE LIVER AND BILIARY TRACT

The liver may suffer penetrating wounds or subcutaneous injuries. Open wounds are usually made by stab or gunshot, and this type predominates in military action. In civil life the subcutaneous injuries, caused by heavy blows or crushing, are more common. Adjacent structures, especially the ribs, diaphragm, kidneys, lungs, and pleuræ, are frequently involved when the liver is injured. Bullets or shrapnel may pass through or lodge in the liver with very little damage or they may have an explosive action with extensive fragmentation of the organ. Subcutaneous wounds are of three types; rupture of hepatic tissue with torn capsule; separation of the capsule of Glisson with subcapsular effusion of bile and blood; hematoma and rupture of the parenchyma without tearing of the capsule.

Death may be caused by hemorrhage or by infection. The former is the most common cause, and when it kills it usually does so within the first 24 hours. Spontaneous cessation of bleeding may occur in small penetrating wounds, in subcapsular injuries, and those involving the diaphragmatic surface. Secondary hemorrhage may occur even as late as three weeks after injury. Infection and peritonitis may follow the escape of bile into the peritoneal cavity. Normal bile is frequently tolerated very well, but infected bile may cause fatal peritonitis or cholemia may be a fatal sequel, so removal of extravasated bile is important.

The symptoms of liver injury are principally those of severe internal hemorrhage. In the typical case there will be a rapid, feeble pulse, subnormal temperature, pallor and cold sweat, rapid

and painful respiration, with tenderness and rigidity of the belly wall over the point of injury. There may be pain radiating to the right shoulder, nausea or vomiting, and slight distention. Some cases show a slow pulse, from 65 to 90, caused by absorption of bile salts, but this symptom may be absent or delayed for several hours. Dullness in the right iliac fossa, due to collection of escaped blood, is occasionally observed. If present, it may show a shifting level when the patient's position is changed and then it is a valuable sign. The escaped blood or bile may flow into the lesser peritoneal cavity and not reach the right iliac fossa, so one should not wait for the appearance of this sign. The blood count will show the changes characteristic of hemorrhage. Effusion of bile without severe hemorrhage may cause a gradually increasing dullness in the epigastrium without anemia but with an increase in the bilirubin content of the blood, as shown by the Van den Bergh test, and possibly jaundice. After two or three days the symptoms of peritonitis may predominate.

Treatment may be expectant if it is a small penetrating wound without evidences of hemorrhage. If there be profuse hemorrhage from the wound or symptoms of severe internal hemorrhage, operation should be done immediately. If, after injury about the liver region, the primary shock does not disappear within two hours; if there be tenderness and rigidity over the liver with painful, shallow respiration, and a blood count suggestive of internal hemorrhage, one should operate at once because of the probability of injury to the liver.

Operation may be done through a transperitoneal, transpleural, rectus, mid-line, oblique, or transverse subcostal incision, whichever will give the best exposure of the probable seat of the lesion. If there is nothing to suggest any particular area, use a high mid-line incision which can be extended laterally if necessary. Good exposure is important.

Small punctured wounds may be closed by sutures passed deeply into the liver substance. These sutures should be of large, absorbable material, passed on a round-pointed needle. They should be tightened very gradually, stopping before they begin to cut through the liver substance. A piece of omentum, fat, or muscle may be used as a plug to fill a hole. Hemorrhage from the liver substance can be controlled by heat and pressure, as the blood pressure is relatively low in the liver. If there be spurting of blood from vessels in the edges of the wound, seize the vessels with a hemostat, push the liver substance bluntly away from the vessels, and ligate them. If this be not possible, a compression suture may be passed through the liver substance around the vessel and tightened enough to control the bleeding. Injury of the large vessels at the hilum may be

quickly fatal, but such injuries have been successfully repaired in several cases. Profuse bleeding from the liver may be temporarily controlled by inserting the index finger into the foramen of Winslow and compressing the hepatic and portal vessels between the finger and thumb until the bleeding vessels can be ligated. Permanent occlusion of the vessels at this point will cause death.

If the liver injury be subcapsular the capsule should be opened, the clots cleared out, and the wound sutured to avoid the danger of secondary hemorrhage. Pieces of fascia, muscle, or omentum may be sutured over the repaired wound to reinforce it. Gauze packing of liver wounds should be done only as a last resort, after efforts at repair by other methods have failed. The gauze should be removed gradually and not earlier than the eighth day. The Mikulicz tampon may be found useful for large wounds with considerable loss of liver substance.

Gunshot wounds may produce a simple tunnel with little tissue destruction or they may cause extensive damage. Always look for a wound of exit as well as for one of entrance. Do not remove the bullet unless it be easily accessible. Simply plugging the wound with a piece of muscle or omentum will frequently suffice. Hemorrhage is the chief danger from these wounds.

Wounds of the gall bladder and ducts are rare, but these structures should be carefully examined if much free bile is found in the abdomen. Small wounds of the gall bladder may be sutured in two layers, but if there be severe injury of the bladder or its duct cholecystectomy should be done. If the hepatic or common ducts be cut, effort should be made to repair them. All these cases will require drainage, and biliary fistula may follow, but this usually heals spontaneously.

WOUNDS AND INJURIES OF THE SPLEEN

Because of its protected position the spleen is rarely involved in penetrating wounds. Most injuries are due to a fall or to being run over by a heavy vehicle. The capsule may be burst by compression or lacerated by a broken rib. Ruptures occur most often in a spleen enlarged by disease, such as malaria or Banti's disease.

The important thing in rupture of the spleen is hemorrhage. This is so severe that one-half of the patients are said to die within the first hour from this cause. The most important diagnostic point is the history of injury in the region of the spleen, followed by evidences of internal hemorrhage. There may be vomiting or nausea, pallor and shock, with pain and rigidity of the abdominal wall over the spleen. Occasionally there is pain radiating to the left shoulder. The effused blood collecting in the left flank may produce dullness in this region, which is a valuable sign, if present, but it is often

absent, and so one should not wait for it to develop. Obliteration of the liver dullness is not constant and is of value only when it occurs within the first few hours. The blood count quickly shows the changes associated with severe hemorrhage and is helpful in the diagnosis. Most cases of ruptured spleen are not diagnosed until the abdomen is opened. Previous knowledge of a spleen enlarged by disease may be helpful.

The treatment of splenic ruptures is operative. Bleeding may cease spontaneously, only to recur when the patient becomes more active and the clots are dislodged. Because hemorrhage is so severe, operation should be done early. If shock persist after two hours of treatment, do not delay operation. Removal of the spleen is not followed by serious after effects, its functions being quickly taken over by other members of the reticuloendothelial system.

Operation is usually done through a left rectus incision, though a subcostal, transdiaphragmatic, or other incision is favored by some. If a midline incision for exploration has been made, it will probably be necessary to extend it across the left subcostal region, cutting the rectus muscle if necessary. As soon as evidence of splenic injury is discovered, immediately compress the pedicle to stop the hemorrhage. Then ligate the pedicle and remove the spleen. Sutures or packing are useless in splenic wounds because of its friability. The pedicle has been tied and the organ left in place, with complete recovery of the patient. This may be necessary in large friable, adherent spleens, but it is not to be recommended.

WOUNDS AND INJURIES OF KIDNEYS AND URETERS

There may be contusions of various grades of severity, lacerations or ruptures involving the kidney, ureter, or both, gunshot or stab wounds. Mild contusions, with only transient pain and hematuria, tend to heal spontaneously, and this is also true of small penetrating wounds which do not involve the pelvis or the large vessels of the hilum. Most gunshot wounds involve adjacent organs, thus adding greatly to their gravity. Rupture may be caused by a heavy blow, forcible flexion of the body, or a heavy vehicle passing over the lumbar region. It may occur without any external evidence of injury. Tearing of the peritoneum with intraperitoneal effusion of blood and urine is rare with rupture of the kidney in adults, but more common in children. When present, it adds greatly to the seriousness of the injury. Solitary and horseshoe kidneys are more subject to injury because they are not so well protected. The immediate danger of kidney injuries is hemorrhage and the secondary danger is sepsis.

The symptoms of kidney injury are hematuria with pain, rigidity, and tenderness in the kidney region. Dullness in the region of the

kidney, with an increasing area and a palpable or visible swelling, due to retroperitoneal effusion of blood or urine, is a valuable diagnostic sign. Blood clots passing down the ureter frequently produce unilateral renal colic. Injury of the large renal vessels in the pedicle may cause a rapidly fatal hemorrhage. The degree of hematuria is not a reliable index of the gravity of the lesion since its appearance may be delayed for several hours. With contusions, the first urine passed may be nearly pure blood, with later evacuations almost free from blood. If it be a penetrating wound, its location and apparent direction are of little help in determining the nature of the kidney lesion.

Differentiation of the purely retroperitoneal injuries from those in which the peritoneum is torn is important but difficult, and this point is often not determined before operation. Hemorrhage limited to the retroperitoneal region is less likely to be rapidly fatal and the appearance of the signs of severe hemorrhage may be delayed for several hours. Intraperitoneal injury is somewhat less likely to occur in adults than in children, who have a smaller amount of perirenal fat. Vomiting, abdominal distention, and reduced peristalsis near the injured area usually indicate peritoneal involvement, but sometimes these are produced reflexly or by the pressure of the retroperitoneal effusion. They are likely to be only transient if the lesion be purely retroperitoneal. If the dullness and swelling are limited to the kidney region and do not move with changes in the patient's position, it is more likely to be retroperitoneal. An effusion within the peritoneum is more likely to be in the iliac region and to be movable.

Indications for treatment: If it be a penetrating wound made by a small-caliber bullet or a narrow knife, without hematuria or severe bleeding from the wound, one may safely delay operation for a few hours. Put the patient to bed; give plenty of water and hexamethylenamin; watch carefully for evidences of severe internal hemorrhage, dullness or swelling in the kidney region, hematuria, escape of blood or urine from the wound, local tenderness and rigidity, vomiting, and abdominal distention. If it be feasible to do so, catheterize both ureters; determine the function of each kidney; determine the amount of blood in the urine from each side, and do a complete blood count. Hematuria with local pain and tenderness but without any evidence of severe internal hemorrhage will not necessarily require immediate operation, but if hematuria be present the patient should certainly be moved to the hospital and every preparation made for quick action if it become necessary.

Operation will be required if there be severe bleeding from the wound, profuse hematuria, evidence of severe internal hemorrhage.

or an increasing swelling in the loin. Perirenal swelling with blood changes characteristic of hemorrhage suggest effusion of blood, while swelling without the blood changes is more likely to be an effusion of urine. In either case operation is required to stop hemorrhage and to drain for prevention of abscess, for it is the rule that perirenal hematomas become infected. Suppuration in this area is likely to cause serious inflammation and perhaps necrosis of the retroperitoneal portions of the colon and duodenum, so early drainage is important. Symptoms suggesting intraperitoneal involvement will require immediate operation, usually by an anterior incision. It occasionally happens that large clots collect in the bladder and require suprapubic cystotomy for their removal.

The operation may be done through any of the usual incisions for access to the kidney. If there be associated intraperitoneal involvement, it is usually better to use an anterior opening first and repair the intraperitoneal damage, as well as the opening in the posterior parietal peritoneum. Then approach the kidney either by reflecting the parietal peritoneum or by a new incision in the lumbar region. If there be profuse hemorrhage it may be controlled during the intraperitoneal part of the operation by compression of the pedicle of the kidney.

As soon as the kidney is exposed, if there be severe hemorrhage, grasp the pedicle and compress it. Then clear out the blood and examine the kidney carefully to determine the amount of damage. If it be only a small laceration, suture it, sew some perirenal fat over the suture line, and try to save the kidney. Remove the kidney if it is badly diseased, severely injured, or if bleeding continues after repair is completed. If the main vessels in the pedicle are injured, nephrectomy should be done. Partial nephrectomy is recommended by some operators when the laceration is limited to one pole of the kidney. Some of the cases treated conservatively at the primary operation will later require nephrectomy because of sepsis, persistent hemorrhage, or urinary fistula, but the percentage of success is sufficient to make it worth trying if the injury be slight.

The pelvis, if only slightly injured, may be sutured or simply drained, but extensive lacerations will require nephrectomy. The ureter should be repaired if possible. If it be completely cut across, try to do an anastomosis of the two ends and if this be not possible, do an implantation of the upper end into the bladder or the large intestine.

All cases of kidney injury will require drainage after operation, because of the probability of infection. The urinary fistulae will close spontaneously if the natural drainage route, by the ureter, be unobstructed.

WOUNDS AND INJURIES OF THE URINARY BLADDER

Rupture may be caused by direct force, such as a fall, blow, or kick, or by indirect force, such as a fall on the buttocks. Penetrating wounds may be produced by stab, gunshot, horns of animals, or by sharp bony fragments of fractured pelvic bones. Practically all ruptures occur when the bladder is full and very many while the patient is intoxicated. The bladder is frequently opened during operations on the pelvic organs or herniae. Gunshot wounds often have associated perforations of the small intestines, which greatly increase the mortality. About 50 per cent of patients with ruptured bladder die from shock, hemorrhage, sepsis, or uremia.

Wounds may involve only the extraperitoneal portion, only the intraperitoneal, or both. They may be subperitoneal when only the mucous and muscular coats of the intraperitoneal portion are ruptured. Extraperitoneal wounds are most often caused by a fractured pelvis. Intraperitoneal rupture, without a penetrating wound, is usually located at the upper anterior surface, where the wall is weakest.

Symptoms of rupture of the bladder are pain in the lower abdomen following an injury in this region, urgent desire to empty the bladder but inability to do so, and passage of small amounts of blood-stained urine. Shock may be very severe, with nausea, vomiting, and evidences of severe internal hemorrhage, especially if there be intraperitoneal injury. Catheterization may be done with aseptic precautions and will produce only a small amount of bloody urine, under low pressure. On digital examination by rectum or vagina it may be possible to feel the tear in the bladder or the fracture of the pelvis which has produced it. X-ray examination may show a fractured pelvis. By cystoscopy one may be able to locate the tear in the bladder wall, but usually there is too much blood for good cystoscopic vision. Injection of measured quantities of fluid into the bladder for diagnosis is mentioned, only to be condemned since it is dangerous and unnecessary.

The symptoms may be mild at first, with increasing intensity as urinary infiltration extends. Several hours after the injury there may be a dull area in the lower abdomen due to collection of urine. The difficulties of diagnosis are increased by the fact that trauma without rupture may produce a reflex anuria. Small tears in the bladder wall may have very slow development of symptoms. Differentiation between intraperitoneal and extraperitoneal rupture is difficult, and not of very great importance, because immediate operation is required in either case. If operation be delayed, the intraperitoneal injury will produce the signs of peritonitis while the extraperitoneal will give evidence of effusion of blood and urine into

the tissues, with cellulitis and perhaps gangrene. The prognosis is very much worse if there be intraperitoneal injury.

The treatment of rupture of the bladder is early operation, usually by suprapubic incision. If rupture is suspected, it is better to do an exploratory operation than to run the risk of a fatal peritonitis. Examine first the extraperitoneal portion of the bladder and, if a tear be found, insert the finger and examine the rest of the organ from within. Multiple tears are not common unless there be a penetrating wound. If a rupture be found and it is accessible, sew it carefully and insert a tube drain down to it. If it is not accessible, simply insert a tube drain into the pelvis. They will heal without suture, but accurate closure shortens the healing time. If there be evidence of intraperitoneal injury, open the peritoneum and suture the tear, bringing serosa in contact with serosa. When repair is very difficult or impossible, insert a tube drain, wrapped in gauze, down to Douglas's pouch. A retention catheter should be kept in place for at least a week. The tube drains may be removed as soon as the flow of urine from them has nearly ceased. After removal of the tubes healing is slow, but seldom fails to be complete, unless there is some obstruction of the urethra.

Frequently the bladder is opened unintentionally during operations for hernia. In such cases it may be sewed up at once without drainage. I have done this several times and have never seen infection or leakage follow it. Gunshot wounds are especially dangerous because they commonly occur in the peritoneal portion and most of them have associated injury of the small intestine or sigmoid.

WOUNDS AND INJURIES OF OTHER STRUCTURES

The pancreas is seldom injured without accompanying injuries of adjacent organs. The lesion may be subcutaneous rupture, stab, or gunshot. There are few characteristic symptoms and diagnosis is rarely made before operation. There may be rigidity of the abdominal wall above the umbilicus with steadily increasing pain in this region. In the course of operations for injuries of the upper abdomen, one should always examine the pancreas. Fat necrosis may be observed on opening the peritoneum, but the blood and pancreatic fluid may flow into the lesser peritoneal sac without producing any visible fat necrosis. Hemorrhage may be severe.

Approach to the pancreas may be by an opening in the gastrophatic omentum; by an opening in the gastrocolic omentum below the greater curvature; by an opening through the transverse mesocolon after raising the stomach and transverse colon. The first route is generally preferred. The lesser peritoneal sac should be emptied of blood and clots and the injuries to the pancreas sutured

if possible. If this be not possible, it may be packed. Free drainage is always necessary, usually by a large tube passed through the gastrocolic omentum below the lesser curvature. Secondary hemorrhage is not uncommon and pancreatic fistula may be obstinate and dangerous because of the rapid inanition it produces.

The abdominal aorta and vena cava may be injured, and death rapidly follows as a rule. Lives have been saved by compression of the abdominal aorta by external pressure and later repair of the wound in the vessel wall.

The diaphragm may be injured by stab, gunshot, by a broken rib, or by crushing. Associated injuries may make the prognosis hopeless, but simple ruptures may be repaired and heal kindly. Diaphragmatic hernia may follow the injury and produce intestinal obstruction. Small ruptures may produce no symptoms except dyspnea and may heal spontaneously. Repair of simple diaphragmatic injuries is usually successful. It may be done through a transcostal incision or one in the anterior abdominal wall.

I would like to give full credit to the various sources from which the facts and recommendations in this article were obtained, but I find it impossible to do so, as it is based on the cases, notes, and reading of 20 years. Lejars' *Urgent Surgery* and H. W. Carson's *Modern Operative Surgery* have proved to be the most helpful reference works.

AVIATION HYGIENE

By R. G. DAVIS, Commander, Medical Corps, United States Navy

The advancement of aviation is closely related to the physical condition of the aviator. Flying efficiency greatly depends upon the careful application of the rules of personal hygiene. The selection of the pilot, using the Navy's highest physical standards, is an important procedure, but his maintenance is a far greater problem. Minor variations from normal, of little importance for "ground duty," may be a potential danger from fatigue and strain of flying. No phase of a medical officer's duty requires a closer study and daily application of the principles of preventive medicine than that required by the supervision of the aviation personnel. Their wide distribution apart from the supervision of flight surgeons requires the attention of all medical officers with whom they come in contact. The insidious symptoms of physical or mental fatigue must be quickly recognized and corrective measures instituted before disaster occurs. Reaction time and movement coordinations are affected by overwork, loss of sleep, exposure, digestive disturbances, alcohol, etc.

Selection and training is of little avail unless the flying career is constantly supported by careful medical observation and the earliest

signs of deterioration evaluated. The eyes are the most important factor of the physical requirements. Their care is essential to insure the best visual judgment. Visual acuity alone will not suffice for there must be a perfect balance of each extrinsic muscle allowing the maximum of binocular vision with no diplopia or nystagmus. The angles of divergence and convergence must remain unimpaired and all coordinated movements free from lagging. The presence of dust, oil, wind, and glare are prone to produce a congestion of the lids and conjunctivæ, which, if allowed to progress, may greatly impair the visual judgment in depth perception for landings or formation evolutions in the air. Goggles with adequate side screens, and lenses of plain nonbreakable glass, preferably tinted for tropical use, should always be worn. No refractive correction can be permitted, as a hasty removal due to fogging with oil, dust, or frost may result in a blurring of vision at a critical time. Goggles must insure a wide visual field, and should be mounted on a face pad of rubber or wool, insuring comfort and protection to the frontal sinuses. The Bureau of Aeronautics has adopted the meniscus decentered type equipped with lenses of three classes; (a) Clear for general use, (b) colored light for day glare and night landings, (c) sun protective, colored dark for day flying and observation in extreme glare. The lenses are of the meniscus type, optically ground to predetermined curves in concave or convex surfaces to produce optical neutrality to light incident to the surface along the optical centers. They are free of astigmatism and show a spherical focus not exceeding 0.05 diopter. The eye cups are fitted to a mask pad of soft sponge rubber designed to fit the face contour snugly. Ventilation is of the positive exhaust type designed to produce a slight reduction of pressure dependent upon the air velocity within the cup, keeping the lenses constantly clear during flights at all speeds.

Visual judgment may be impaired following a recent attack of influenza or a prolonged application of the eyes in close technical problems, reading of fine instruments, fatigue from high-altitude flights, or accidents of slight concussion. The many factors predisposing to visual error are easily overlooked unless their potential pathology is recognized.

The ears also demand constant attention. The necessity of maintaining equal air pressure on each side of the drum is thoroughly known to the experienced aviator. He must quickly accommodate to the diminished pressure of altitude and its effect upon the air inclosed within the tympanum and sinuses of the nose. Variation in size of the external auditory meatus or of the Eustachian tubes requires equalization of air pressure by swallowing, and this is the practice on rapid descents. It may be necessary to expand the drums

by holding the nose and blowing when catarrhal or other congestions are present. Unless the Eustachian tubes are easily opened, the flier should be kept out of the air. Marked unequal drum pressure may produce severe pain and possibly perforation. Scarred or congested drums are disqualifying on selective examination. Pilots who complain of deafness on landing, with dizziness, discomfort, or pain in the ears, nausea, vomiting, headaches, or fainting usually show invagination of the drums or, in less severe cases, distortion of the blood vessels and general congestion. Unilateral Eustachian obstruction may produce vertigo and lack of coordination. Hearing acuity is reduced from the constant roar of high-power engines, making it essential in flights to keep a plug of cotton in the external auditory canals. Many pilots have found it satisfactory and more convenient to sew a powder puff in each ear flap of the helmet.

The upper air passages should be kept free and unobstructed. Enlarged turbinates, spurs, mucosa congestions, or any evidence of sinus infections should be corrected. The lungs can not be satisfactorily expanded in mouth breathing, for it has been demonstrated that there is one-fifth less air inhaled with each breath than by nasal breathing. Minor conditions may be greatly aggravated by dust, oil, or gasoline fumes, and rapid changes of temperature may result in frequent attacks of rhinitis and diseases of the middle ear. Oral hygiene should not be neglected, in order to prevent bacterial infections from the teeth and gums.

To prevent body chilling with the resulting increase in catabolism, calling for more oxygen in an already depleted atmosphere, clothing is a most essential consideration. Specially designed clothing should be worn according to the nature of the flight undertaken, dependent upon altitude, weather conditions, and the degree of protection afforded by the type of plane. The temperature drops 5° F. for each 1,000 feet of altitude, hence at 30,000 to 40,000 feet a temperature of 65 to 70° below zero is encountered. The body must be kept surrounded with layers of warm air between the several layers of loosely fitting wool or silk. The mesh and not the thickness prevents the heat loss. Freedom of movement is very essential, and ready removal of the clothing can be accomplished by a metallic "rip" arrangement. Chamois masks are provided for excessively cold weather, but a thin layer of cold cream applied to the face will give protection. The hands are usually protected by gauntlet gloves covered by a finger muff, easily removed for finger instrument work. Electrically heated suits are rarely needed. The feet and legs need to be protected by several layers of wool or silk hose, which should be changed frequently as the heat-retaining power is lessened by wear compression. On lighter-than-air flights the heavy outer cloth-

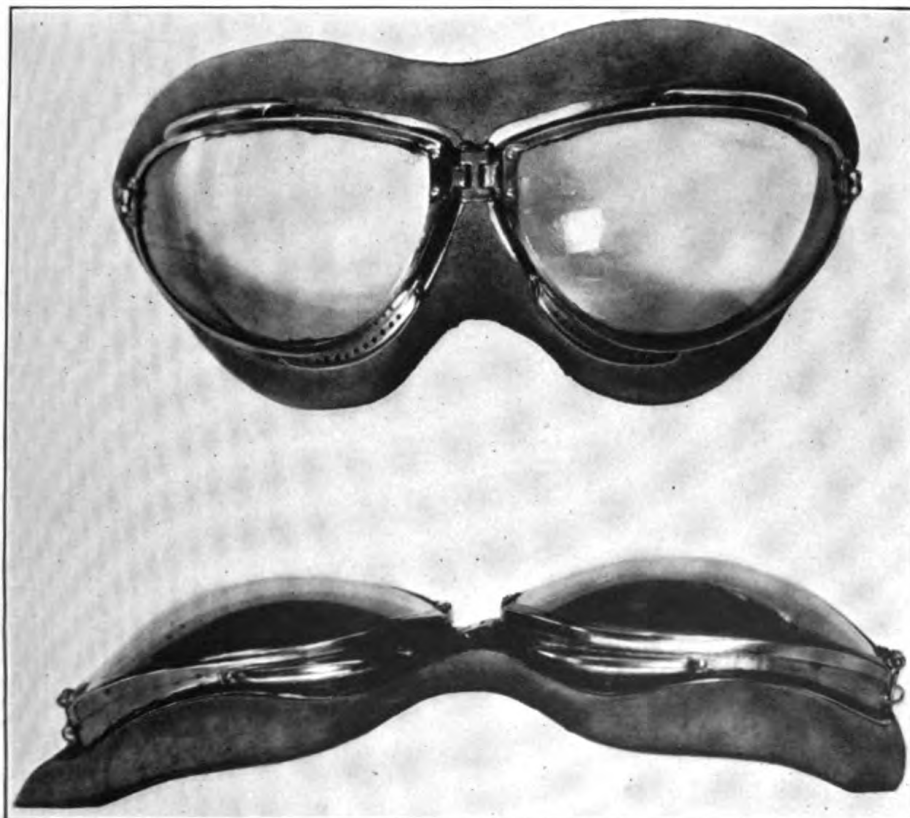


FIG. 1.—MENISCUS DECENTERED GOGGLES

834—1



834-2 FIG. 2.—STANDARD LAP AND BACK TYPES OF PARACHUTES

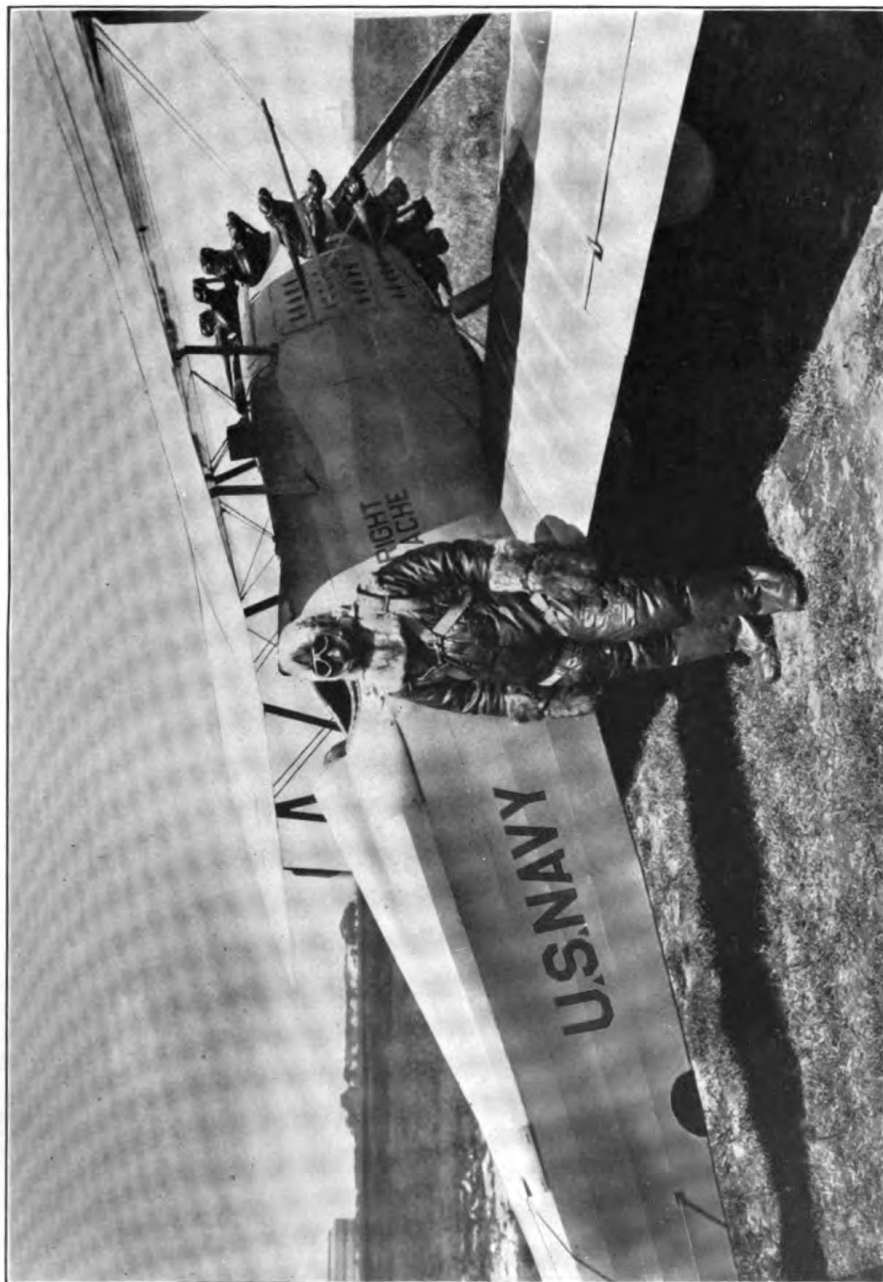


FIG. 3.—DRESSED FOR ALTITUDE FLIGHT. EXPECTED TEMPERATURE, 70° BELOW ZERO

834—3

ing should be removed and dry, thinner sleeping clothing put on to insure relaxation. Chilling when overheated should be guarded against.

Medical officers should investigate if all unnecessary blind angles in the plane construction have been eliminated and if the fuselage surfaces have been thoroughly padded, particularly the forward cowling, to prevent lacerations or skull fractures at times of forced landings or crashes.

Adequate exercise is necessary to maintain the physical condition of flying personnel. During the war physical trainers were attached to all aviation units and systematic sports and games were a part of the daily routine. A good athletic history is a valuable asset in selecting aviation material. Sports develop eye and limb coordination, mental alertness, inculcate morale, and result in a high degree of respiratory and circulatory efficiency. An unconscious form of deep breathing is acquired. The tone of the thoracic and abdominal muscles is increased and the general metabolic activity of the tissues stimulated. When favorite recreations, such as swimming, rowing, golf, tennis, hand ball, etc., can not be regularly indulged in, the standard forms of setting-up exercises are beneficial. Mass athletics add zest to the energy expended. The body covered with loose clothing and hardened by an outdoor life, with regular periods for rest and sleep, will most efficiently resist staleness and circulatory asthenia.

Dietary indiscretions should be avoided and liquids limited to reduce kidney stimulation when exposed to the cold atmosphere of altitude. Alcohol produces early fatigue, a slowing of reaction time, errors in judgment, impairment of depth perception, and of fine coordination of movement. Excessive smoking produces shortness of breath, nervousness, and quickening of the heart's action, reducing the optimum respiratory and circulatory efficiency, so important to the flier.

Staleness should be constantly guarded against. The strain of flying produces a progressive lowering of efficiency with a depression of mental and physical physiological activity. One is prone to expend more energy than can be recovered in the period of sleep. Schneider defines staleness as "a neural condition founded on chemical changes within the body," and describes the various types as:

"(1) *Cardiorespiratory*.—Pulse increased in rate, poor in volume, and low in tension. There is distress on slight exertion accompanied by an inordinate rise in pulse rate and prolonged time of return of the pulse after exercise; breathing shallow and rapid; extremities poor in color, cyanotic, and cold.

"(2) *Nervous type*.—Poor muscular control of balancing movements; fine tremors of the hands, eyelids, and tongue; apprehensive

starts, with sudden sensory experiences; disturbed sleep, loss of sleep, nightmare.

"(3) *Muscular type*.—Tenderness of the muscles, with loss of tone, flabbiness, loss in power, which may be marked or slight. These symptoms may be confused with rheumatism.

"(4) Staleness may be brought about also by disorders of digestion characterized by removal of normal inhibitions, i. e., response to sensory stimuli by excess of motion, hypersensitiveness, annoyed by bright light, little noises, etc., restlessness."

The condition of staleness is a potential factor in crashes, and demands prompt corrective measures according to the type of symptoms presented. A complete rest or change of environment for from a few days to a month will often return an efficient pilot to his plane, whereas a nervous breakdown is likely to result if this be neglected. The most practical and ready means of detecting staleness is the application of the Schneider's index. It is based upon the relation of six factors: (1) The reclining pulse rate; (2) the standing pulse rate; (3) the difference between the reclining and standing rates; (4) the difference between the standing pulse rate and the rate after a standard exercise; (5) the length of time it takes for the exercise rate to return to the normal standing rate; and (6) the difference between the reclining and standing systolic blood pressures. Allowing three points for each factor, the highest to be obtained is 18; 14 to 18 is rated as excellent; 11 to 13 very good; 9 to 10 fair; 7 to 8 doubtful; and below 7 disqualifying. The application of the index is described in the Manual of the Medical Department. It should not be given within two hours after a meal, and several examinations should be made before rejection is recommended to allow for temporary nervousness or other nonpathological conditions. After several examinations the normal for each individual is obtained and future variations may be appraised. This index has proved of great value in the operating squadrons and a friendly rivalry is manifest when the weekly scores are posted.

Poisoning by "dope" used on aeroplanes may present a health hazard, as poisonous chemicals are used. Amyl and butyl acetate, gasoline, denatured alcohol, and cellulose comprise the standard "dope" and concentrated fumes may produce headaches, dizziness, drowsiness, and nausea. As the fumes are heavy, they gravitate to the floor and workers should stand on platforms of slats allowing the "dope" fumes to fall through to be expelled by exhaust fans. The blood and urine of "dope" workers should be examined monthly. All workers should spend five minutes of every hour in the open air and should not remain in the room at all unless at work. Soluble "dope" is best eliminated by a persistent milk diet which is easily

digestible and furnishes a large amount of fluid favoring kidney action.

A recent addition to aviation hazards is the employment of ethyl fluid which has as its base tetraethyl lead. Its use permits a higher compression ratio in the motors and results in an increased economy and power without detonation and overheating of engine parts. Ethyl fluid mixed with gasoline is known as ethyl gasoline and is marketed throughout the country under such names as "Esso" and "Atlantic Ethyl." Ethyl fluid itself is not sold by its manufacturer, the Ethyl Gasoline Corporation, for commercial use, but is sold to the Navy to be blended by Navy personnel with aviation gasoline. Danger of lead poisoning requires the usual precautions employed in the lead trades and in painting with lead base paints. There are three possible sources of danger in handling ethyl fluid or ethyl gasoline:

1. The absorption of lead from the exhaust pipes.
2. The absorption of lead in overhauling engines in which there are deposits of lead from ethyl fluid.
3. In handling the ethyl fluid itself.

Of these three possibilities, extensive investigation indicates that neither the first nor the second method constitutes any real danger. The dilution of the exhaust gases due to the propeller slip stream is so high that no danger results. The hazard from the second method is no greater than that resulting from working on any other metal in which lead may be present. The blending of ethyl fluid with gasoline constitutes a real danger. Men should be careful not to get the fluid on their hands or clothing, and if this can not be avoided, it should be washed off with soap and water immediately. Care should also be taken to avoid breathing the fumes.

In the present rapid progress of aviation each phase presents its peculiar medical problems. It is only by constant study and appreciation of the new and increased demands upon the physical condition of the aviator that "the ounce of prevention" renders unnecessary "the pound of cure."

GOITER¹

By CLIFFORD E. HENRY, M. D., F. A. C. P., Commander, Medical Corps (Vol. 8), United States Naval Reserve

It has been estimated that at least 5,000,000 goiter cases exist in this country, and as a result the medical literature for the past few years has been very rich in the number of articles dealing with the subject of goiter. In a somewhat extensive review of this literature it has been observed that the vast majority of the papers have to do

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with the surgical treatment and give no consideration to prevention, the etiology, or medical care. Many authors apparently consider an enlarged thyroid gland as a "lump in the neck that should be cut out." Some have written very vehement articles against any other form of treatment than surgery, and almost accuse a physician who makes an effort to cure a goiter by any other means than surgical removal as guilty of malpractice.

Let it be understood, then, that in this paper there is no war with surgical treatment in indicated cases—those that have had proper medical supervision for a reasonable time and continue to show cardiac disturbances. "An encapsulated, neoplastic goiter must be removed" (Bram). The author will also admit that in all cases of exophthalmic goiter the primary results of a successful operation are very beneficial to the patient, as all the distressing symptoms are relieved.

Kocher observes a mortality of 1.53 per cent, while the Mayos reduce theirs to less than 1 per cent. This refers only to the operative mortality. The ultimate results, even those obtained by such experts, tell a different story. Judd and Pemberton, of the Mayo clinic, give 45 per cent as the proportion cured eight years after operation. Starck, reviewing the final results obtained by several German surgeons, places their ultimate cures at approximately 30 per cent. While this country contains many surgeons of the first order, can we conscientiously admit that they all possess the skill of Kocher or the Mayos in thyroid surgery, which is admittedly precarious in many of its phases? To place the mortality rate at 6 per cent and the ultimate result, after four years, for instance, at 18 per cent, is to overrate the ability of surgeons other than those of the first order.

Medical treatment, even on the empirical lines given in textbooks, affords a better showing. While Syllaba does not have to impose upon his patients the test of "operative mortality" his percentage, based upon 51 cases of 15 years' standing, gave over 33 per cent as the average rate of recovery reported by physicians. "When physicians have learned to depend mainly upon the removal of the primary factor of the disease, the source of the toxin or toxic factor which starts the thyroid on its thyrotoxic rampage, they will greatly increase the proportion of permanent cures." (Sajous: *Tice's Practice of Medicine*, vol. viii, p. 253.)

Some one has said, "The perfect functioning of the body depends upon the perfect functioning of the thyroid." Too often a patient is seen who has been thyroidectomized and after a few months all the old symptoms have returned, or a patient in whose case the surgeon was a poor guesser and removed too much thyroid gland and the

patient is doomed to take a daily dose of thyroid extract the rest of his life. There is too much of this hasty arrival at decision to operate without fully investigating the probable cause. Often cases with extreme exophthalmos, marked tachycardia, very noticeable tremor, etc., under proper management return to normal and remain normal. The extent of medicinal treatment instituted by many physicians is iodine in some form, most frequently Lugol's solution, and rest in bed. If this fails to produce results after only a few days or a few weeks, then resort is made to surgery. In fact, iodine and rest are more often used as the preparation for surgery than with an idea of curing the disease. Quoting one author, "The mortality rate may be raised a little higher by operating, but so many more will be saved that it makes it worth while to accept the risk of this increased mortality."

The removal of colloidal or cystic goiter that has already destroyed considerable thyroid gland tissue can only result in a condition of hypothyroidism for the individual.

That a goiter is but the local manifestation of a systemic disease, and not a disease in itself is apparently lost sight of by many physicians whose writings have been reviewed. A classification of goiter given by Ochsner, and his ideas of this classification, are quoted as meeting with the author's idea. This plan is followed in this discussion of the subject:

- I. Cysts.
- II. Simple adenomatous goiter with or without degenerative changes.
- III. Toxic adenomatous goiter.
- IV. Exophthalmic goiter.

Some very excellent clinical observers believe that these are four distinct disease entities. With this I can not agree. I believe they are all the same in origin, and are simply varieties of the same disease, depending upon the resistance of the individual and the severity and nature of the toxins or irritants acting. Thus I have never been able to see clearly the line of demarcation between a simple adenomatous goiter with liquefaction of the gland substance and a cystic goiter, or between a simple adenomatous goiter and a toxic adenomatous goiter, or between either and an exophthalmic goiter.

It has recently been taught that the secretion from the thyroid acts by sensitizing nerve cells generally, but particularly the sympathetics. The brain is the energizing force of the organs of the body and it in itself depends upon the secretions from the thyroid, the adrenals, and the liver. Marine says, "The peculiar function of the thyroid is the splitting up of the iodine-containing molecules of any compound of iodine that enters the body and the conversion of this iodine into thyriodine or thyroxin." Plummer believes that the chief action of thyroxin is upon the tissue cells, where it acts as a

catalytic agent, and controls their energy output. The varied effects upon the nervous system noted in hyperthyroidism are accompanying manifestations and do not represent the primary effect of the thyroid substance upon the tissues. It is evident that iodine is an essential element, and in the prophylaxis of goiter, particularly in known goiter regions, the child showing a tendency to formation of a goiter should have a certain amount of iodine, introduced either with the food or drinking water. The universal administration of iodine, with its propaganda favoring the use of this drug indiscriminately, is a menace to the health of the community (Bram). After the twenty-fifth year of age iodine exerts little or no beneficial effects on goiter (Crile).

By the improper use of iodine or thyroid products many cases of quiescent goiter, especially of the adenomatous type, are converted into exophthalmic goiter or hyperthyroidism (Crile). In adolescence, in females particularly, the combining of thyroid with iodine and ovarian substance often seems to have a more beneficial effect than either one alone. Pregnant women are very prone to the development of goiter. The probable cause for this is that the vital organs are unable to cope with the unusual demand made upon them and the thyroid is forced into increased activity. After delivery very often the enlarged gland returns to nearly normal size. Repeated pregnancies will result in permanent enlargement, and the impaired health that often results from frequent, close pregnancies induces a condition of hyperthyroidism. This can be prevented if early in the pregnancy, when a slight enlargement of the thyroid is first noticed, small daily doses of iodine are instituted. The sexual life of the individual must be supervised, sexual neurasthenia, prolonged engagements, sexual incompatibility, and coitus interruptus all have an important bearing on the neuroendocrine system of the patient and are potent factors in the induction of overactivity of the thyroid. Persons with a nervous make-up that overtax the already overworked nervous organism by social duties, and double-duty wives, i. e., those who work outside the home and keep up a home, are also prone to the development of goiter. The removal of gynecological lesions has often resulted in the cure of exophthalmic goiter. This has been observed in the author's cases on several occasions. Hyman's opinion is that exophthalmic goiter is a complicated disease based on a disturbance in the involuntary nervous system, activated by many sympathomimetic factors, of which infection and psychic trauma are examples, so that there is produced a metabolic upset whose origin is obscure. Treatment should be directed at the sympathomimetic influences responsible for the disorder rather than at the cause of the metabolic disturbance.

That basal metabolic tests are infallible is an error usually entertained by the enthusiastic laboratory man who has not sufficient opportunity to observe the human being under stress and strain of thyroid dysfunction or of Grave's disease. Rather would I trust the trained senses in the diagnosis of the presence and severity of hyperthyroidism than a mere brainless instrument, the sources of error in the manipulation of which are numerous enough to fill a good-sized monograph (Bram). Focal infections are of prime importance in the cause of goiter. Apical abscesses, infected tonsils, and sinus disease are generally recognized. Diseased gall bladders, pus tubes, and kidney infections are equally important, though not so generally recognized. Often the physician in charge will remove infected tonsils and teeth and stop, expecting the enlarged or overacting thyroid to return to normal; often it does, but that is only a part of the treatment; all the other factors that may have a bearing should be taken into consideration. The intestinal tract is generally recognized as being a source of focal infection. Repeated contamination of the intestinal tract with colon bacilli acts as a toxic agent. If too large a number of colon bacilli are ingested over a period of time the thyroid becomes hyperactive in order to counteract the toxins produced.

Ochsner recites an incident where a family of eight all had goiters. It came about on investigation that the drinking water was from a cistern that was filled by rain water draining off of a barn in which there was a dovecote containing about 100 pigeons. Upon gaining a new source of drinking water, in six months all were free of goiter. He also recites his experience with the farmers in Waukesha County, Wis. It is in a glacier deposit belt and goiter is very common. He had an analysis made of the drinking water and found it contained colon bacilli in large numbers. Ochsner also has some radical ideas of drinking water as the important factor in the production of goiter. His opinion is that the iodine in the drinking water acts as a destroyer of colon bacilli.

Meat intolerance is generally recognized as a source of toxic infection that causes hyperthyroidism. This is well illustrated by a very interesting article by Hans Curschmann in a recent German magazine. He states that during the World War exophthalmic goiter almost disappeared from the German clinics. During the hunger period in Germany the number of cases seen was not one-fourth of those seen before the war. Since the war they are reappearing. During the war the people had very little meat, no butter or cream. He raises the question if the best treatment of hyperthyroidism is not a meat-free diet, fattening the patient on an abundance of carbohydrates, milk, and cream.

Rudolf Balint claims that the dietetic treatment of this disease has attained a scientific basis. He claims that proteins, especially meat, increase the function of the thyroid gland; and on this basis he has worked out a diet containing plenty of carbohydrates and fat, while the protein is supplied by foods poor in tryptophan. Tryptophan is the basic material of thyroxin and is removed by the thyroid gland from the tryptophan content of the nutritional protein. Because of this it is highly probable that the tryptophan-poor proteins stimulate the function of the gland less than those which contain large amounts of tryptophan. Corn is poorest in tryptophan and is followed by rye and potatoes; green vegetables and fruits also contain very little tryptophan. Meat, milk, cheese, eggs, and wheat contain large amounts of tryptophan. With this information a diet list can easily be worked out.

Race has some influence, as it has been noticed that Jews are more frequently sufferers from this disease, while Negroes with hyperthyroidism are seldom seen.

In regard to a direct treatment of goiter, X ray and radium have been found to be very successful, though many surgeons disapprove of any form of radiation of the gland. They claim that the use of X ray or radium causes perithyroiditis with formation of adhesions and makes the removal of the gland much more difficult. Barker says in his article in the March, 1924, *International Clinics*, "Radium over the thyroid or thymus, or X ray over these glands, may be, in many cases, as efficacious as surgery."

Moses Gunn devised a method of treatment that is little short of startling in results. As a surgeon no one will deny that Ochsner was a master, hence his abandoning surgery and adoption of this form of treatment is of greater weight, and it would not be well to close this article without reference to this treatment of goiter:

1. Determine the type of goiter.
2. Make sure the condition is not a calcareous cyst.
3. Make sure there is not a calcareous deposit in the gland tissue.
4. Determine if there is a focal point of infection anywhere in the body, and if one be found eliminate it if possible.
5. If colon infection be present, determine the source and eliminate it; at the same time take measures to change the intestinal flora.
6. If there is meat intolerance, direct a diet free of meat or meat extracts; permit only milk, cream, and butter.

The positive treatment consists in injections of a 5 per cent aqueous solution of phenol directly into the enlarged thyroid. Use a 22-gauge needle about $1\frac{1}{4}$ inches long and an all-glass syringe, injecting 1 cubic centimeter of the solution, increasing by 1 cubic centimeter each injection up to 6 cubic centimeters in extreme cases. The neck is

sponged off with alcohol; then the patient is directed to swallow. The needle is inserted into the gland and the patient is again requested to swallow. A few moments are waited to make sure the needle has not punctured a blood vessel, and if not, the injection is made. Things to be avoided are:

1. Infection; strict asepsis must be maintained.
2. Injection into large blood vessels.
3. Recurrent laryngeal nerve.
4. Puncture of the trachea.

Contraindications for this method of treatment are:

1. Tumors, malignant and benign.
2. Calcification of the gland.
3. Calcareous cysts.
4. Impending strangulation.

Advantages over thyroidectomy possessed by this method are:

1. No danger to parathyroids.
2. No danger of producing artificial myxedema.
3. No serious danger to recurrent laryngeal.
4. No operative scar.
5. Larger per cent of cures.
6. No recurrences.
7. Lessened morbidity.
8. Lessened mortality.
9. Lessened expense to patient.
10. Greater applicability.

Ochsner, in summing up his experience, states: "I did my first goiter operation 27 years ago and did it successfully. Like most surgeons, for a time I operated more and more goiter cases until eight years ago. Then I did some serious thinking and came to the conclusion that we were doing too many goiter operations. For the last eight years I have been getting away from thyroidectomies. First, the simple adenomatous, then the smaller and less toxic ones, and the last couple of years all except those excluded in the above four type of contraindications. I think that 98 per cent of the goiters can be cured without operation by first removing the cause and then injecting a sterile 5 per cent aqueous solution of phenol under aseptic precautions into the thyroid gland. I have injected 182 cases without a death and without a failure. Seven of the cases successfully treated had previously been operated upon, two twice, and five once."

J. Marion Reed says: "Subtotal thyroidectomy nearly always produces a remission of the disease if the patient survives the operation, but it does not constitute a cure."

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**SOME COMMENTS CONCERNING THE DUTIES OF THE COMMANDING OFFICER
OF A NAVAL HOSPITAL**

By A. FARENHOLT, Captain, Medical Corps, United States Navy

In 1775, Paul Jones wrote to the marine committee, "It is by no means enough that an officer of the Navy should be a capable mariner. He must be that, of course, but also a great deal more * * *."

In precisely the same way, it is by no means sufficient that a medical officer, fortunate enough to be charged with the administration of a naval hospital, be gifted with and exhibit the possession of strictly professional qualifications alone. He must of necessity possess sound attainments and keep well abreast of the rapidly expanding times, just as the mariner must; however, the primary

requisite of efficient knowledge and care of the sick falls far short of exhausting his field of activity. A sympathetic régime of justice and fairness, and the securing of contentment, are among the intangible desiderata, while a judicious economy, a sufficient provision for recreation and relaxation, and a well ordered commissary, may be mentioned as examples of the more material requirements to be attained before success may be recorded.

Although these aims are readily recognized, the methods employed by individuals to secure them are, of course, and properly so, divergent. Where one wins by eternal vigilance and a thorough mastery of his work, another succeeds through aptitude and personality, and the efforts of "a happy band of brothers" or, better still, a combination of both.

The routine and required duties are fully detailed in our Regulations, in Instructions to Medical Officers, in various circular letters, and in local orders. A discussion of them is not contemplated, and the following remarks are intended simply to recount certain observations concerning the general conduct of the "day's work," and have chiefly to do with administrative details.

The naval medical officer stands in a somewhat different position from that of his civilian counterpart, the head of a civil institution. He has a considerable resident or semiresident staff. He is guided and advised by a central body of brother officers; he is indoctrinated with the same traditions and customs as is that body and which govern and impress his coworkers both in the service at large and in his own hospital. He is accustomed to feel and to employ a discipline which is in keeping with the Navy in general. He is free from any considerable interference, and his position is in general well established and assured. These and many other differences direct his energies along pleasant lines and should insure efficiency and contentment.

Just as the commandant of a naval station has become more and more a superintendent or coordinator, and the industrial manager and various other chiefs of departments have taken over the more intimate executive details, and as the commanding officer of a vessel has become more dependent upon the heads of his highly technical departments, so the commanding officer of a hospital finds it necessary, in addition to a complete knowledge of professional duties, to perform the supplemental work of an administrator and a business executive. And this is as it should be; in such a capacity his field of usefulness is yearly becoming broader, and to have a good working knowledge of the conduct of affairs in the various professional departments, of the intricacies of hospital housekeeping, of the handling of civilian as well as naval personnel, and of the letter and

spirit of the desires of his bureau in particular and of the Navy Department in general is in itself a responsible work, and to accomplish it properly a sufficient achievement.

Perhaps the most important duty of a commanding officer, after insuring the correct treatment of the sick, is to secure general contentment among the various units of his personnel. The different behavior of various commands is less a difference of the individuals concerned than it is their reaction to the attitude of the common superior. He may not completely realize it, but he "sets the pace" and his subordinates instinctively are thus influenced. He is, of course, required to set a "good example of virtue, honor, and patriotism"; however, this alone would hardly fulfill his obligations. If the commanding officer is gracious, courteous, and "sunny," his juniors will in varying measures notice and imitate it. If he is neat in appearance, that outward sign of an inward grace, if he is to be relied on for sympathetic justice, if he is quick to notice merit and opportunely to praise, they are very apt to conduct themselves in like fashion with those subordinate to themselves. In this respect it would be good policy to follow the old adage, "Assume a virtue if you have it not."

It is always advisable to delegate as much responsibility as possible to juniors. It is felt as a compliment and is the true way to direct development. It is not only fair, but good policy, to let a subordinate alone when he is attempting to carry out orders. When he has been selected for the work intended and understands his orders, then "stand aside and let him work it out for himself." It is the result more than the method employed for which he should be held accountable. Good work should invariably be noticed and commented upon and neglect or inefficiency corrected in such a manner that no sense of injustice, of nagging, of personal enmity, or of resentment remains.

Rebukes or decisions made in hasty anger are seldom judicious. The suggestions and recommendations of others should be encouraged, and, unless chimerical, investigated or tried. An unapproachable man loses many valuable possibilities. Somewhere between the evil of too great severity and a disinclination to award necessary punishment lies the judicious course at the mast. Both extremes lead to discontent. A feeling that justice will be accorded promptly, impartially, and with a probable uniformity is a greater deterrent than an exhibition of temper, a verbose sermon, or an uncertain and variable severity.

The periodical meetings of the entire commissioned staff to present papers, to discuss cases, to profit by lectures and talks by specialists and prominent local professional men, and to receive instructions

and explanations by the commanding or executive officer are of the greatest possible value. To a large extent these little talks will take the place of a profusion of standing and special orders, a multiplicity of which it is always desirable to avoid. With a well-edited and not too large book of Hospital Regulations and a small order book kept well up to date, these explanatory talks will completely inform the staff of all duties required. Staff conferences should never be permitted to become tiresome. Papers by junior men, prepared from textbooks, while they serve to accustom a young man to public appearance, are of little interest. Similar meetings of the pharmacists and leading chief petty officers have in some places been instituted and will always prove to be of great benefit. The formation of clubs, chapters, and allied activities among the patients is of questionable propriety. Their mental attitude under unfamiliar and unappreciated surroundings and their transient character, for our institutions are in no sense domiciliary, are more apt to develop annoying exhibitions of self-interest and baseless criticism than to result in constructive effort. The prompt return of patients to duty is not only required by regulations but is a moral duty. Local conditions and problems of hospital upkeep very often interpose a strong temptation to retain certain men beyond the time necessary for their rehabilitation, but this practice is incorrect and should not be permitted. As in a repair shop, we should get our work completed and returned as promptly as possible.

The manner in which inspections are conducted varies very materially in accordance with the inspector's desires and with the physical requirements of the institution. The old days, when a half hour's Sunday morning walk around in a frock coat sufficed, are long passed. It is now necessary at large stations and desirable in smaller ones to divide this duty so that at least two days are so designated. The personnel inspection customarily falls on Saturday morning. This examination will enable each patient to come face to face with the commanding officer and afford him the primary right to address him, which is one of the original reasons for this custom. To delay unduly the course of this inspection, when men more or less ill stand beside their beds, is not advisable. Clinical examinations, unnecessary conversations, and other time-consuming acts are then out of place. Many are waiting for the order to "carry on" and are anxious to go on liberty. Lengthy visits to the sick, inspection of nurses' books, of the details of cleanliness, and the many other necessary matters should be made at another time when the ward is not at attention. On another day inspection of the various other activities may be made and the commissary units, nurses' quarters, power plant, shops, garage, Hospital Corps' and civil employees' quarters, occupational

shop, storerooms, and the many other various activities examined in detail and at convenient length. To require an officer junior to the executive occasionally to conduct an inspection, other than that of Saturday morning, affords him excellent training and frequently brings some surprisingly good recommendations.

A certain amount of rivalry is essential in all organizations in order to bring out anything more than an ordinary performance of duty—it has even been proposed to apply to hospitals something of the competition and reward that is held in the fleet among the various classes of vessels. This, for certain fundamental reasons, would be difficult and at present inadvisable. However, a friendly rivalry of the different wards should bring about a general betterment. This reward may be, for instance, a painted and portable "E," which may be assigned to the ward, which during a certain period, say weekly, is adjudged to have made the greatest improvement during that time and is in all ways superior.

The commanding officer with the executive and the chief nurse may properly form a board of award. In addition to the physical sign of merit, an extra liberty for corps men, commendation of the nurse, and a remembrance of the good work of an officer at the time of making out of fitness reports, would insure an interest in the competition.

Economy and a judicious utilization of wastes are very essential if costs are to be kept down, but if too rigorously carried out and too much stressed are apt to be disadvantageous to the sick and unwelcome to the personnel. The golden mean can only be obtained through a sympathetic cooperation of "all hands." A proper economy is largely a matter of sound personal judgment based on natural thrift and developed by experience. In this the commissary officer has a large share of responsibility, and to keep the ration down while conducting his department with general satisfaction is not a simple task. He has to consider not only the general mess but also the special diets, food carried to the wards and officers' messes; he has his problems with civilian labor and with contractors and various purveyors. He therefore has one of the hardest and most highly specialized of hospital details. Thoughtfulness in the purchasing of articles other than those on the supply tables is most important. Generally speaking, the various supply tables should take care of almost all of our wants under the heads concerned. A few special or new drugs, instruments, etc., must be purchased, but there should be a real reason for each expenditure, considered and approved by the commanding officer. The chief clerk, as the usual material and budget officer, must consult frequently with the commanding officer concerning the many requests submitted for new material, repairs,

labor, surveys, requisitions, and the innumerable assaults constantly made upon the hospital finances. Very often the article is not needed; often something else can take its place; the supply depot may have it in stock or the supply officer has a similar article. In the matter of construction and rather extensive repairs, a very considerable loss may result if thought is not given to the sanctioning of work. Before this is done estimates should be obtained not only from the local public-works officer but from outside contractors. A job order on the former may be an expensive course. For much of the work that comes to us our own civilian employees can, under supervision, accomplish excellent results—the laying of concrete walks, grading, filling, inside and outside woodwork; in fact, a good deal of all work can be done, just as on shipboard, by our own people. This is undoubtedly cheaper and usually more satisfactory. The chief nurse can assist very materially in the accomplishment of justified economy. In her contact with the linen room, the laundry, the wards and operating rooms, in the diet kitchen, and in pursuit of her housekeeping activities she is in a position to check extravagances, utilize waste materials, limit unauthorized issues of food, dressings, beddings, and generally hold the costs down.

The two customary ways to control the various departments of the civil pay roll are either to employ a leading man, termed a "chief mechanic" to superintend all such departments, or, eliminating that office, to communicate directly with the senior workman of each class. The former is, without doubt, the more practical method. Such a man can be of the utmost advantage. He should possess the general knowledge of a good contractor and know the details of all the trades represented. He should have the confidence of those under him and an intimate knowledge of local and general naval ways and means. He should consult the commanding officer each morning and receive his orders for the day, and both of them should inspect the shops and the work under way at least once a day.

It is well to bear in mind that there are certain confidential papers, files, discharges, transportation, codes, etc., for which the commanding officer is personally responsible, and the loss of which would prove to be disastrous.

Certain duty hours are customary throughout the service; however, some laxity is apt to creep in if a good example is not set by the senior officers and the offices should be open and the day's work commenced before the arrival of the civilian clerks. There is always enough to do and things are apt to be at a loose end in the early morning. The custom of having certain hours for the signing of mail is a good one, but a better one is to be in the office frequently throughout the working hours of the day, for the presence of the commanding officer is

hourly required for a multiplicity of reasons. The arrangement of rooms for various subordinate officers naturally varies with the structural details of various hospital buildings; however, if possible, it is a good plan to have a room for each of the large services, such as surgical, medical, and neuropsychiatric, in which are the desks of the chief and subordinate officers of each department. This is of obvious advantage and of mutual benefit.

The commanding officer should not overlook certain extraprofessional duties which officers must not neglect. In contact with civilians and all persons visiting the hospital, a patient and painstaking courtesy should be shown. Neglect of this elementary requirement has often resulted in loss of prestige both in and out of the service. The required calls on the commandant and those customary to seniors should be made and all officers should contribute to the social life of the station. The local medical societies and meetings should be visited, good feeling maintained with civilian practitioners, and near-by hospitals and clinics frequented. Such intercourse is not only essential in its relations to ourselves, but should be required in order to maintain a sympathetic respect for our corps in outside circles. Courtesies extended by civilian clubs and organizations must be scrupulously acknowledged and properly repaid.

In former days the customary strict and exacting courtesy among gentlemen was nowhere more rigidly held than in the naval service, and in those days the medical officer almost invariably more than held his own. As an older and usually better educated man, he was often the confidant and close friend of the commanding officer and was frequently detailed for important diplomatic or social duties. Two frigate medical officers were, at different times, assigned to the temporary post of United States consul in the early days in the Mediterranean. This is not the place to amplify the remarkable heritage which our predecessors have left to us, but we should appreciate it and endeavor to indoctrinate the junior gentlemen with its spirit. Until one feels this spirit, the Navy is to him an incident, an episodal avocation; to such, esprit, tradition, and the love of service mean nothing.

The mere performance of duty, however meritoriously carried out in a routine manner, is not sufficient in itself to stamp a man as one possessing more than average value; to be worthy of praise, to be justly called "a good officer," one must have the vision to see, the will to do, and the ability to accomplish acts over and above ordinary work.

THE BUDGET AND THE BUREAU OF MEDICINE AND SURGERY ACCOUNTING SYSTEM¹

By B. E. IRWIN, Chief Pharmacist, United States Navy

I have been requested to deliver a lecture on the Budget and the Bureau of Medicine and Surgery accounting system—two rather dry subjects for medical officers who are more interested in health and disease than in finance, but subjects that each of you will have to deal with sooner or later.

Perhaps it would be best to begin by saying something about the origin of the budget system in Government finance, its purpose, and how that purpose is accomplished.

While the budget system is an innovation in the United States, it has been employed by the foremost countries of Europe for years. It has been in effect in England for more than 200 years.

The word "budget" is used in a variety of senses, but it is usually employed to designate that system of annual finance which is employed by the governments of practically all civilized countries, whereby the executive is made responsible for the preparation as well as the execution of the budget. Any well-managed corporation or business enterprise should have an annual budget.

You are, of course, familiar with the old system of finance that was in effect in the United States before the budget system was adopted. In those days the legislative branch of our Government prepared the financial measures through the committee system. No scheme or plan was drawn up in advance and the financial policy, if there were any, was decided by the party caucus, or conference of the party in power. These committees having charge of the various money bills worked independently of each other and the bills were reported out at any time during the session. When they passed both Houses they were sent to the President for his signature of approval just like any other law.

No one knew in advance what the Government proposed to spend during any fiscal year. No one person or one group of persons was responsible for the demands made upon the Treasury or upon the taxpayers. The responsibility was diffused amongst a large number of committees, both of the House of Representatives and of the Senate, and was shared also by individual Members on the floors of the two Houses.

The various bureaus and departments made their estimates on the basis of what they thought they should have. Each one had a financial policy of its own—and hoped that it would gain favor with the congressional committees into whose hands its estimates fell. But

¹ A lecture delivered at the U. S. Naval Medical School, Washington, D. C.

each one knew the attitude of Congress toward the estimates. They knew that the committees took great liberties with the estimates, ignoring, increasing, decreasing, and rewriting them as they saw fit. This had an effect on the motives of the departmental officials. They frequently asked for more than they needed so as to make allowances for the inevitable reductions by the committees. In other words, the departmental estimates in those days were not a bona fide presentation of actual and imperative needs such as are the estimates under the budget system.

The cry for more business in government finally brought about the adoption of the budget system—during the Harding administration—and General Dawes, now Vice President of the United States, was appointed the first Director of the Budget.

The budget system renders the national finances more democratic. It takes away the mystery of secret influences and in its place it has a procedure that is open and accessible. The public is taken into confidence as regards the Nation's finances. It is assured that what is being done is for the public benefit only.

Economy is effected by the budget system. The Budget Bureau stands as a safeguard against waste and extravagance. The program that is submitted to Congress for ratification represents the actual bedrock needs of the Government. Every item in the estimates has been threshed out by experts and scrutinized by the Director of the Budget. Many claims for new expenditures and increases have already been modified or rejected during the course of the preparation of the estimates.

The budget system enables the Government to have a definite financial policy. The executive departments are thus allowed to operate and develop according to a stable and consistent plan. For example, the War Department, or the Navy Department, may lay out a scheme of operations extending over several years, although only one year's expenditure—at a time—appears in the Budget. The direction of the whole Government service is then in the hands of the President who, of course, is represented by the Director of the Budget. The financial policy must, however, in every case, gain approval of Congress, and in order to accomplish this it is sometimes necessary for the President to modify his policy to meet the wishes of the legislators.

In the budget system the idea of control is highly developed. Perhaps the most important phase of control over the Budget is that exercised by Congress. By holding the President responsible for the preparation of the Budget, Congress is free to review and criticize. This is one phase of legislative control. It has its effect, indirectly, on the preparation of the estimates. The President is careful to avoid a policy which would be open to just criticism by his

political opponents. The criticism of the minority, ever on the alert for defects in the policy of the party in power, has a wholesome effect upon the Nation's finances.

There are other phases of control in the budget system, but we haven't time to go into them at present. At all stages, from the beginning of the preparation of the estimates to the final examination of the audited accounts, either the President, Congress, or the comptroller is exercising a direct control over the whole Budget.

No such radical change as that brought about by the adoption of the budget system is ever accepted by all parties concerned without protest. The conservatives, who look with alarm upon any change in established customs, protested the adoption of the budget system by the Government, but we progress through change, and time has vindicated the system. The vast reduction in Government expenditures it has brought about is a matter of record and common knowledge to all of you.

The Budget in its first stages takes the form of estimates of expenditures and of income. These estimates are prepared in the Budget Bureau. They show in itemized detail what the Government proposes to spend and for what purposes, and where and how the money will be raised to meet this outlay. For the purpose of comparison the items of the Budget are set in parallel columns with expenditures made in previous years. A balance sheet is presented giving the totals to be spent in each department, an estimate of the total revenues, and certain other totals by way of comparison with former years.

Since these estimates are not merely for the information of the Legislature, but are the real basis of legislation, they are required to be prepared with the utmost skill, patience, and honesty. Each department has a Budget officer, who is in constant intercourse with the Director of the Budget throughout the year. Any change, expansion, or new work involving an increase of expenditure for the coming year must be specifically approved by the Budget Bureau before it can be included in the estimates. The Director of the Budget knows about what items are going into the estimates before they are prepared. Of course, the director always fights on the side of economy, and he is considered by the public to be the greatest protection to the taxpayer.

An accounting system is, of course, a necessary adjunct to a budget system, for the object of the budget system can be accomplished only if we have facts and figures at hand to work with. What we hope to accomplish with a budget system is to anticipate the financial requirements of the various Government departments, to keep expenditures within the funds at hand, and to apportion these funds to the various departments and to the various bureaus, so as to meet

the most urgent requirements and promote efficiency in governmental administration.

In order to estimate the future requirements of the different departments it is necessary to refer to past expenditures, and to take into consideration anticipated projects and policies differing from those of previous years.

The Budget Bureau requires these estimates one year in advance of the fiscal year during which the expenditures are to be made.

At the time the budget system was adopted by the Government the Bureau of Medicine and Surgery in the Navy Department had no accounting system worthy of the name. The Bureau of Supplies and Accounts kept a record of appropriational expenditures for all bureaus of the Navy Department, including the Bureau of Medicine and Surgery, but the cost of operating the various medical department activities was an unknown quantity. A cost system was not then considered necessary, because it was taken for granted that if the current appropriations made by Congress were not sufficient to meet the requirements, a deficiency appropriation was to be had for the asking.

The deficiency appropriation was the "rich uncle" of all Government departments, and no one worried very much if an annual appropriation was overexpended. The result, of course, was that each Government official made such expenditures as he considered necessary or desirable to operate his particular establishment, and only a soothsayer could foretell the total cost of running the Government during any fiscal year.

With the budget system in effect and a new régime at the helm of Federal business, the fiscal agents of the Government were brought about with a round turn. The department head or bureau chief who permits the overexpenditure of an appropriation for which he is responsible can expect nothing less than the loss of his position. Needless to say, there is no longer the need for deficiency appropriations there once was.

As I have previously stated, in order for the Budget Bureau to know the requirements of the different Federal establishments, each department is required to submit an estimate of the funds that it will require to function during the fiscal year, and these estimates are required one year in advance of the period during which the funds are to be used.

In order that these estimates for the Bureau of Medicine and Surgery might be as accurate as possible, the Surgeon General established a cost-accounting system in the medical department of the Navy. The object of this accounting system is to determine and record the actual operating cost of each and every medical department activity.

The system has now been in effect for three years, and the general favor it has met with, its prompt and quiet adoption, the hearty cooperation of all medical department personnel in its functioning, the results which speak for its efficiency, all are a credit to the man who, under the Surgeon General's direction, constructed the accounting system and put it into effect—Chief Pharmacist W. R. Joiner. The Director of the Budget has complimented the Surgeon General on the Bureau of Medicine and Surgery accounting system and has held it up as a model for other departments.

In addition to the determining and recording of operating costs there is another phase of the accounting system, and that is the application of the budget system to the various Medical Department activities. This phase is merely an extension of the budget procedure to ultimate points of expenditure, and is accomplished by means of estimates, allotments, and requiring report of expenditures to the Bureau of Medicine and Surgery in exactly the same manner that the Budget Bureau deals with the different departments.

By applying the budget system to the individual ships and stations the Bureau of Medicine and Surgery is able to determine in advance the requirements of the various Medical Department activities and to make allotments to them according to their needs to the extent of funds available. By requiring quarterly reports of expenditures from each activity the bureau is kept informed of the status of the Medicine and Surgery appropriations and can regulate expenditures accordingly.

In this lecture I have endeavored to give you a general idea of the budget system as applied to the Government finances and the Bureau of Medicine and Surgery accounting system. I have intentionally avoided going into the many details of the accounting system and the preparation of estimates for the Budget.

The principle of the budget system is plain and easy to grasp; the object of the accounting system will be readily understood and its importance fully appreciated. The bookkeeping procedures required of the Medical Department activities of ships and stations are very simple and are already understood by the majority of Hospital Corps men. At hospitals, where the accounting procedures are somewhat more complicated and require a knowledge of double-entry bookkeeping, the records are kept by a specially qualified civilian bookkeeper.

The Medical Department of the Navy is an organization administered, directed, and controlled, for the most part, by medical officers. The medical officers are required to be leaders and executives as well as physicians and surgeons. The successful executive does not want to be bothered with the minor details of his establishment. He

leaves them to his subordinates. The Navy medical officer has Hospital Corps men, and possibly a pharmacist, who are expected to know and to do the clerical work in connection with the accounting system. But you should know the object of the accounting procedures, the purpose and the importance of the accounting and the budget systems.

It is but natural to expect anyone to do a thing better and more willingly if he knows why he is doing it and that he is accomplishing something worth while by doing it. Cooperation among the integral working units of any organization is essential to its successful administration, and the success of the budget and accounting systems, so far as the Medical Department of the Navy is concerned, depends almost entirely on the whole-hearted cooperation of the Navy medical officers.

After the annual budget has been approved by the Director of the Budget Bureau and by the congressional committees concerned, the appropriation bills are reported out of committee and in due time are passed by the House and the Senate. Perhaps it can hardly be said that they are always passed in due time, but it takes money to make the Government go, and each year, sooner or later, Congress manages to get out the appropriation bills. After these bills have been signed by the President, an account is set up on the books of the Treasury for each appropriation.

ANNUAL APPROPRIATIONS PERTAINING TO THE BUREAU OF MEDICINE AND SURGERY

The annual appropriations included in the naval appropriation bill that pertain to the Bureau of Medicine and Surgery are classified under the following titles:

- (a) Medical Department.
- (b) Care of the dead.
- (c) Salaries, Navy Department.

The detailed objects of expenditure under the fixed titles may be found in each annual digest of appropriations.

The Naval Hospital Fund was established by Congress in 1811 to provide for the erection and operation of naval hospitals. The Naval Hospital Fund is not an appropriation, nor is it made up of moneys at any time appropriated by Congress; it is a trust fund which derives its revenues from within the naval service and is administered by the Secretary of the Navy, who is the sole trustee of the fund.

These sources of revenue are:

- (a) By the deduction of 20 cents per month from the pay of each officer, seaman, and marine. (Secs. 1614 and 4808, R. S.)
- (b) By fines imposed on officers, seamen, and marines. (Sec. 4809, R. S.)

(c) By the value of one ration per day allowed for each officer, seaman, and marine during his continuance in hospital, the value of the ration for this purpose being specified under "Provisions, Navy," annually, in the naval appropriation act. (Sec. 4812, R. S.)

(d) By the relinquishment of disability pensions due officers, seamen, and marines during continuance in hospital. (Sec. 4813, R. S.)

(e) By forfeitures on account of desertion. (Naval appropriation act, June 7, 1900.)

Expenditures may be made from the Naval Hospital Fund for the purchase of hospital sites, the erection of hospital buildings, building wharves, fences, extension of buildings, and all expenses of maintenance and upkeep, including provisions and other supplies, equipment, furniture, fuel, light, minor and major repairs, and for the support of patients in civil hospitals at home and abroad. Every expense for the proper establishment and maintenance of a naval hospital may be paid from the Naval Hospital Fund, except as Congress may assume to provide for certain expenses by specific appropriation, as for instance, under "Medical Department" for the pay of civil employees, for the purchase of and feed for horses and cows, and the purchase of automobile ambulances. Specific provision in an appropriation act estops the use of the Naval Hospital Fund for the same purpose.

Navy Regulations require that all purchases and payments therefor, so far as the Navy is concerned, shall be made under the direction of the Bureau of Supplies and Accounts, and orders directing such purchases and payments shall be given only by that bureau. The Bureau of Supplies and Accounts is charged with all duties that relate to the contracting for and purchasing of all supplies and material for the Naval Establishment.

It is well to bear this in mind. If you are ever tempted to authorize a contractor to furnish something which does not comply in every detail with the terms of his contract, even though the variation may be to the Government's advantage, please remember that medical officers do not have authority to modify contracts drawn up by the Bureau of Supplies and Accounts or by its representatives in the field who are, of course, the supply officers.

The great bulk of the purchasing for the Navy is done in the Bureau of Supplies and Accounts. This centralization of purchasing enables the Bureau of Supplies and Accounts to consult the commodity experts, procure the advice of the technical experts of the other bureaus, and to benefit by the opinions of the legal advisers of the department. The Navy's organizations and widespread activities make it inadvisable that all of the buying be done in the Bureau of Supplies and Accounts. Small but necessary purchases, emergency calls, and strictly local requirements of comparatively minor impor-

tance are handled by officers of the Supply Corps on duty at the various yards and stations and aboard ship. This procedure, of course, expedites action on requisitions and makes the purchasing more convenient for all parties concerned.

The statutes governing purchases for the Navy and the Naval Regulations issued pursuant thereto, require that all supplies and services for the Navy shall be procured under contract or formal order, such contracts to be entered into or formal order placed in advance of the delivery of the supplies or of the performance of the services. Purchasing officers and supply officers, prior to making purchases or entering into a contract, must possess specific authority therefor in the form of a duly approved requisition bearing a written order of an officer competent to direct such action.

If, at any time, you require medicines or medical supplies of any kind in an emergency and you find it is necessary to buy them in the open market, be sure you have a requisition signed by the senior officer present authorizing the purchase before it is made, and if there is a supply officer around, let him do the buying, for medical officers have no authority to make purchase contracts for the Government, or to expend Government funds; and the Government is not bound by the unauthorized acts of its agents.

When obligations against the Navy are incurred without the prior authorization of a formal order, or contract therefor, such obligations can be settled only on a quantam meruit basis and disbursing officers of the Navy are not authorized to discharge obligations of this kind. Such obligations, therefore, must be submitted as claims to the General Accounting Office for settlement.

All of which means simply that if a medical officer goes out and makes an unauthorized purchase regardless of the emergency, even though it be to save a life, the Government is under no legal obligation to make payment therefor. Of course, the Government is under a moral obligation to pay for such purchases and it is for this reason that the regulations permit the submission of such obligations to the General Accounting Office, where they are considered and usually paid. Occasionally such claims are not allowed and dealers and contractors who have sold goods or rendered services to the Government in good faith find that they have dealt with agents who had no authority to make purchases for the Government or who had not complied with the requirements of the statutes in making the purchases. The result is, of course, that the Government agent who has acted beyond the scope of his authority becomes himself personally liable for his unauthorized act.

If you are interested in the general statutory requirements relative to purchases for the Naval Establishment you can find the most of them in chapter 6 of the Manual of the Supply Corps. It is a

truism that all persons are presumed to know the law, and the statutes governing Government purchases are no exception to the rule.

I have previously stated that no purchase should be made involving a charge against the Government unless authorized by an approved requisition, and the requisition must be dated and approved in advance of the purchase—so we come to the subject of requisitions.

In the Medical Department of the Navy we have open-purchase requisitions, supply depot requisitions, and stub requisitions; but, of the three, the open-purchase requisition is the most important and causes the most trouble to medical officers.

The Navy Regulations, the Supply Officers' Manual, and the Manual of the Medical Department all contain instructions for the preparation of open-purchase requisitions, but seldom a day passes when the bureau does not have to return one or more of these requisitions for correction, besides the many that are corrected in the bureau.

Makers of requisitions frequently have trouble in drawing up satisfactory specifications for the items called for. The first thing to do in drawing up specifications is to see whether the items are covered by Navy Standard Specifications. If they are, the only thing to do is to refer to the standard specifications, copies of which can be obtained from the Bureau of Supplies and Accounts. Article 1609, Navy Regulations, directs that "requisitions for material for which standard specifications have been adopted shall adhere strictly to such specifications. Should it be necessary to modify the standard specifications, reasons for such modification shall be stated and, except in urgent cases, the requisition and reasons for modification shall be submitted to the bureau concerned." So, if the material you want is covered by standard specifications, it is not only advisable to use them, but their use is mandatory in all cases where they will meet the requirements.

Another source of trouble to makers of requisitions is the proprietary article. In private life, if we want to go out and buy a Reo ambulance, a Crescent dishwashing machine, or a Furnell floor polisher, all that is required is the money or credit, but in Government purchases the law requires competitive bidding. You must specify what you want in a general way so that bidders may be required to furnish articles meeting the service requirements, but you are not permitted to make a requisition for a Cadillac ambulance when a Ford ambulance would meet the service requirements—and this principle holds true from ambulances to surgical needles.

It sometimes happens that the product of a particular manufacturer is required and no other will, in fact, meet the service requirements. In such cases the law permits the purchase of these proprietary items, but proprietary requisitions are always a possible source of trouble

and should be generally avoided. A proprietary requisition must contain this certificate:

The above-mentioned material is proprietary to the-----
Co. and no other will meet the requirements of the naval service for the reasons
stated below:

Explicit reasons should be stated as to the necessity for calling for the proprietary articles.

There are many other errors frequently found in open-purchase requisitions, but we have not time to mention them all here. The Manual of the Medical Department is now being revised, and in the new edition the instructions relative to the preparation of requisitions have been revised and brought up to date.

Now, there remains but one more thing that I wish to bring to your attention, and that is the subject of surveys on Medical Department property.

There was a time not so long ago when the vast majority of property surveys were approved by the Bureau of Medicine and Surgery as a matter of routine and the reports of the survey boards were accepted without question, but that day is past. These reports are now given special attention, because the costs of operating the Medical Department activities, as recorded by the accounting system, are influenced to a considerable extent by property surveys.

The ratio of the cost of Medical Department property surveyed to the entire operating cost of an activity is an indication of the degree of control and conservation exercised by medical officers over the property in their charge. You may be surprised to learn that the bureau can often predict with certainty a rise or fall in the operating costs of Medical Department activities with the change of medical officers. I make this statement on the strength of my own observations during the four years I have been in the finance division of the bureau, and I do not know that I am expressing the opinion of anyone else in that respect, but there is no question about the bureau taking cognizance of increases and decreases in operating costs, and it is not necessary to stretch the imagination very far to assume that these increases or decreases are associated with the medical officers who are responsible for them.

So if a decrease in the operating cost of a Medical Department activity follows your arrival on the scene and the decrease is due to your good management, do not think that your efforts will go unnoticed in the bureau and, on the other hand, if an increase in operating costs invariably follows a medical officer, the bureau may eventually get the idea that his talents lie in the direction of medicine or surgery rather than in administration.

To go back to the subject of surveys, let me advise you to read articles 1907 and 1908, Navy Regulations, which deal with this subject. You will get some new ideas there that are not to be found in the present Manual of the Medical Department, and, of course, all bureaus and their representatives must abide by the Navy Regulations.

Here are some of the instructions contained in Navy Regulations relative to property surveys:

(1) Each survey shall be made a matter of most searching and exhaustive investigation by the surveying officers; in every case the responsibility shall be definitely fixed or a statement be made showing clearly why such can not be done.

(2) When the responsibility is definitely fixed upon a person in the naval service, the officer ordering the survey shall refer it to such person for statement, after which the survey and statement shall be forwarded to the department, via bureau concerned, with comment and recommendation by the officer ordering the survey.

(3) In all cases where such action is proper the officer ordering the survey or the commanding officer of the vessel shall take such disciplinary action as the circumstances require. In every case in which responsibility is fixed upon a person in the naval service the officer ordering the survey will enter a statement on the face of the survey to the effect that disciplinary action has or has not been taken.

(4) When the department considers that surveys indicate that proper care has not been exercised by officers in charge of equipment or stores, a statement to this effect will be entered in the record of the officer concerned.

(5) Where reports of survey indicate that the proper investigation has not been made by the officer or officers composing the board of survey and clearly show that the board has not fully appreciated its responsibility, the manner of performing the duty will be entered in the record of the officer or officers signing the report of survey and of the officer approving same. In each case the officers concerned will be notified of the department's action.

It would be well to remember these regulations if you are ever appointed a member of a survey board, which, of course, each of you will be many times during your naval career. A survey report, especially where missing items are concerned, is something to be taken seriously. The person on whom the survey board places the responsibility for missing property is not in an enviable position. If he is unable to submit a statement satisfactorily explaining the circumstances surrounding the missing items, his record may suffer on account of it, and a blot of this kind on a record may be just enough to cause an officer to be passed over by the selection board.

Now, I have covered in a general way the Budget, the Bureau of Medicine and Surgery accounting system, appropriations, requisitions, and property surveys. There are many other reports and returns included under the heading of Property Accountability, such as job orders, inventories, transfers, public bills, etc., but they are for the most part very simple and readily understood and usually give no trouble.

So I shall continue no further, except to thank you for your kind attention and to say that if you care to ask any questions on the subjects I have mentioned I shall be glad to answer them to the extent of my ability.

THE ELECTROCARDIOGRAM IN THE DIAGNOSIS OF THE CARDIAC ARRHYTHMIAS¹

By R. L. NATTKEMPER, Lieutenant Commander, Medical Corps, United States Navy

The electrocardiographic method supersedes all other graphic means of diagnosing the various cardiac arrhythmias. It records exactly the time relations of auricular and ventricular systoles; there is no time interval involved in transmission as curves are inscribed directly from the heart wall and the complete events in cycle are read off from a single record.

The electrocardiograph may be defined as an instrument which records the electrical production coincident with the contraction and relaxation of the different chambers of the heart.

The current produced in the heart during its contraction and relaxation is, by suitable leads, connected with a string galvanometer and causes deflections up and down of the string, these movements being photographically reproduced.

This article has been prepared from the references given with the object of presenting in an available form the essential factors for interpreting the arrhythmias.

The pictures have been selected from among various ones taken at this hospital.

Three leads from each patient are taken. These are right arm to left arm, right arm to left leg, and left arm to left leg, numbered 1-2-3, respectively. Other combinations could be used, but these three cover the different axes of the heart and are adhered to in order to secure uniformity. Different combinations may be used, but each results in a specific type of wave for the lead.

Normally, each complete heart cycle is originated by an impulse forming in the sino-auricular node. This node lies in the right

¹ From United States Naval Hospital, San Diego, Calif.

auricle just below and in front of the entrance of the superior vena cava.

The auricle contracts in response to this impulse and the contraction spreads radially over the auricles to the auriculoventricular node or node of Tawara. This node is located at the auriculoventricular septum in the upper part of the bundle of His. The impulse arriving at the auriculoventricular node starts an impulse which travels down the bundle of His toward the ventricles. The bundle divides upon the top of the interventricular septum into right and left branches, one to each ventricle. These branches in the ventricles rapidly divide into very fine ramifications known as the fibers of Purkinje and come to lie on the endocardial surface of the ventricles. This minute division of the bundle in the ventricle facilitates the rapidity of its contraction as it is stimulated simultaneously at so many different points.

The waves of the electrocardiograms are named arbitrarily P-Q-R-S-T, and rarely a U wave may be present.

The origin of these lettered waves in relation to the occurrences of the heart beat may be very briefly stated.

The P waves result from the spread of the contraction wave over the auricles.

The Q-R-S group of waves results from the spread of the contraction wave over the ventricles.

The T wave occurs during the latter part of ventricular systole and is probably the result of irregular time of contraction or relaxation, or both, of various muscle fibers in the ventricle.

The U wave is regarded as resulting from the walls of large vessels inducing a change in electrical potential, but is rarely present.

The electrocardiogram is divided into small squares; these in height represent 1 millivolt, and reading horizontally from one vertical line to the next, 0.04 second in time. The larger squares equal 0.2 second, and by counting 30 of these and multiplying by 10 the rate for one minute is obtained.

In determining the height of waves in millivolts the reading commences at the upper and lower limits of the base lines, respectively.

The term "supra-ventricular," as referring to the Q-R-S group of waves, is frequently used and indicates that the origin of the impulse is above the bifurcation of the bundle of His. The Q-R-S does not alter its form no matter where the impulse may originate, so long as it is above the division of the bundle. Impulses originating below cause a marked and characteristic deformity of the Q-R-S, as will be noted.

The normals for the different waves and intervals as essential for interpreting the arrhythmias are given.

P WAVE

Height, 1 to 2 mv.

Voltage determines height.

Height indicates functioning capacity; over-height would mean hypertrophy.

Normally up, maybe diphasic, notching or doubling of peak not significant.

Duration, 0.08 to 0.1 second.

Interval between end of P and beginning of Q-R-S group may show deflections. These are of no significance.

P-R INTERVAL

Sixteen one-hundredths of a second from beginning of P wave until beginning of Q-R-S group. It is the auriculoventricular conduction time.

It is the time from the sinus node to the ventricles.

Usually largest in lead 2.

Varies with heart rate.

Extremes, 0.12 to 0.2 second.

Prolonged time is indicative of poor condition of the bundle tissue or of excessive activity of the vagus.

Q-R-S GROUP

Great number of variations.

Upper R highest in lead 2.

Normally R is up in all leads.

1. The change in Q-R-S has to do with the proportional size of the left to right ventricle, and not with a uniform hypertrophy of each.

2. Position of heart influences height of R wave, as a drop heart tends to give a small R-1, and large R-3, and vice versa.

3. Most frequent causes of variations are the course and arborizations of the Purkinje fibers. The shorter the course to the ventricle, the more will the impression of preponderance be given.

Splintering, if marked, or a vibratory complex of lead 1 can not be considered normal.

Slurring or thickening of the R wave has the same significance as notching, if not near the base line. If near the base line, disregard it.

Notching and slurring may be considered normal if they do not occur in more than one lead. Never in two leads, unless near the base line. Abnormal always if present in all three leads or if near the peak in high waves.

SIZE OF Q-R-S

Minimum of 7 mv. and maximum of 16 mv.

DURATION OF Q-R-S

Measured from either Q or R, depending upon which commences first, to S or R, whichever ends last. This time indicates the spreading of the contraction wave throughout the ventricle, or, in other words, it is the time required for the contraction to involve the entire ventricular muscle. Time, 0.06 to 0.1 second. Shorter in childhood. Prolonged duration has to do with auriculoventricular bundle and its branches.

T WAVE

1. *Direction*.—Normally, is always directed upward in leads 1 and 2. May be downward in lead 3. Various positions of the heart influence it, as they do the Q-R-S waves.

2. *Height*.—Normally, should be from 2 mv. to 5 mv. Its height may be taken as an indication of the strength of muscular contraction.

S-T INTERVAL

Deflections up or down never more than 1 mv. 0.08 second of time; at times 0.12 to 0.16 second.

DURATION OF T

From beginning of Q-R-S to end of T may be considered as the duration of systole. Time depends upon rate of heart beat, 0.32 to 0.42 second.

The following arrhythmias, with the factors for their interpretation from the electrocardiogram, are considered:

SINUS ARRHYTHMIA

This results from variations in the activity of the vagus. The vagus acts upon the pacemaker and the stimulus then originates irregularly, depending upon the vagus activity. The waves, after origin, spread regularly and are all normal, the only abnormality being that of the rhythm. The common type is an increase of vagus activity during expiration and slowing of heart rate, with decreased vagus activity and increase of heart rate, during inspiration.

In some cases vagus activity extends from 10 to 20 seconds. There is no change in the form of the waves, they are all the same, and a condition then results of a long, suddenly occurring pause which is known as sinoauricular block. The P waves are not abnormal and

subsequent waves follow in their usual order regardless of vagus activity.

Occasionally the pause gets so long that the ventricle initiates a rhythm of its own and thus occurs the phenomenon of ventricular escape.

The Q-R-S which results is not deformed. The stimulus is supra-ventricular, probably in the auriculoventricular junctional tissue. If the inhibition of the auricles continues, there may result a nodal rhythm, which is slower than normal, and the impulse is then supposed to travel back to the auricle, causing it to contract. In this case, the P usually falls after the Q-R-S and is deformed.

Ventricular escape should be limited to a lessened irritability of the auricle and not to an increase of ventricular irritability.

PREMATURE CONTRACTIONS

These may originate in any part of the auricle or ventricle or in the auriculoventricular connecting system.

Premature auricular beats.—The diagnostic point is the premature occurrence of a P wave that is different from those of the usual contraction. It arises from an ectopic focus in the auricle at a time prior to the regular impulse from the sinoauricular node.

The resulting abnormal form of P distinguishes it as a premature contraction, even if the time interval varies only a few hundredths of a second.

P may fall on the preceding T wave or it may be in the diastolic interval.

The Q-R-S follows after a normal P R interval. Latent defects of the auriculoventricular bundle are often brought out by premature contraction and thus cause prolonged P R.

The premature contraction may occur so early that the ventricle is still in its refractory stage, and thus no Q-R-S would follow the P.

The Q-R-S following the premature P is only very slightly different. The same applies to the T.

These aberrant contractions are supposed to result because the wave does not spread normally over the finer arborizations, as the rest period is not sufficiently long.

Compensatory pause follows upon premature contraction, but it never does exactly compensate for the premature beat. The more nearly it does so the nearer the focus is to the sinoauricular node.

Premature ventricular beats.—Large upward or downward Q-R-S, which may be slurred or notched on one or both sides or at the peak. Interval, 0.14 to 0.2. The T wave following is always much larger, but in the opposite direction, unless deflection of Q-R-S is very small.

Not preceded by P wave usually, although it may be present, and then the P R interval is very short. P wave occurs at its proper rhythmical intervals, and may fall on the Q-R-S or on the T.

The compensatory pause is sufficiently long actually to compensate. In a very slow pulse a premature contraction may be interpolated between two normal contractions. In such cases the pulse is not perceptible at the wrist.

The resulting Q-R-S is abnormal in form for premature ventricular contraction, because the focus is ectopic and the spreading of the wave over the ventricles follows an abnormal course. Q-S is increased, as in bundle-branch block, because there is delay in the spreading of the contraction wave.

The ventricle originating the beat is determined the same way as is predominance.

Ectopic ventricular heart beats are considered usually to originate in the Purkinje fibers, but may also arise in the muscle wall itself.

Nodal premature beats.—A premature contraction may arise in the node or in the bundle. When this occurs, no P will be found to precede the Q-R-S and the Q-S interval is essentially unchanged, showing that the impulse arrived at the ventricle along its regular course.

The term "supraventricular" applies to any impulse originating above the branching of the auriculo-ventricular bundle. The resulting Q-R-S is the same as the normal for the individual, with very slight variation at times. The pause is compensatory, as the sinus node is not concerned, as is the case in premature auricular contraction.

Multiple premature beats.—In the same record there may occur premature contractions, either auricular or ventricular, in which the deflections are different. This would indicate a great number of different foci and thus signify a more extreme myocardial disease. If successively there are several ectopic beats from the same focus, the condition may be expected to develop into a paroxysmal tachycardia.

If different ectopic foci originate premature contractions, then auricular fibrillation may be anticipated.

HEART BLOCK

This condition is a depression of the function of auriculo-ventricular conduction. If only slight, it can not be recognized clinically, but the P-R is increased. The condition is regarded as the precursor of block, either partial or complete. If more marked, it leads to irregular heart action, with dropped beats. If complete, there may be regular rhythm.

. INTRAVENTRICULAR BLOCK

This is often called bundle-branch block. It affects the branches in the ventricle and has nothing to do with the condition of heart block.

COMPLETE BLOCK

This, also, is due to disease of junctional tissues. The disease may be of the node of Tawara or in the bundle before branching. Overactivity of the vagus will not cause complete heart block. Digitalis may cause an increase of P-R and, if this be marked, it may be assumed that disease of the bundle contributes to the result. It is questionable as to whether digitalis will cause block sufficient to result in dropped beats in a normal bundle. In diseased hearts the conduction system varies from time to time in its ability to transmit impulses. Various combinations may occur and persist over varying lengths of time, as the ventricle may respond to every second P or every third P.

A special feature to note is that the form of wave does not vary, regardless of the type of block present. Ventricular waves do not show aberration. Superposition may occur, but does not do so regularly.

PARTIAL BLOCK

In this only occasionally does the P stimulus arrive at the ventricle. There is contraction of the ventricles which results from a supra-ventricular impulse arising in the auriculo-ventricular bundle or in the bundle before it divides. Rarely there also may be a focus in the ventricle and, if so, the typical type of Q-R-S seen in premature ventricular contraction is present.

COMPLETE BLOCK

There is complete dissociation between auricles and ventricles. The auricles have their regular rate and the ventricles their own regular rate. The Q-R-S may or may not be of the supraventricular type. They may vary; there may be foci in the ventricle giving rise to premature ventricular contraction.

Auricular fibrillation may be present with complete block but it does not influence the ventricular rhythm.

Stokes-Adams' syndrome, noted with the electrocardiograph, shows a failure of ventricular contraction for a varying interval, then convulsion. Then resumption of ventricular contraction results, it seems, from exhaustion of irritability of the focus in the ventricle which is again stimulated by accumulated CO₂. Stokes-Adams' syndrome is seen also in partial block, but the mechanism is different. In this, the block suddenly becomes complete and the interval lasts

$\frac{5}{8}$ seconds before ventricular escape occurs or the P stimulus may get through.

TACHYCARDIA

This may be regarded as physiological in that it is merely an acceleration of a normal heart action. It can be identified on the electrocardiogram by the normal P and Q-R-S for the individual in their proper sequence. The only changes are the result of the rapid rate and are short PR, Q-R-S, T, and a low amplitude. The increase and decrease in rate are gradual. The rate is rarely above 150. Any rate over 150 is probably paroxysmal tachycardia unless the electrocardiogram shows otherwise or hyperthyroidism is present, in which very rapid rates occur.

Paroxysmal tachycardia may have a rate as low as 100 or as fast as 210 or more. It is a series of premature beats arising in an ectopic focus which is so rapid that it takes control of the rhythm. Attacks of rapid heart action resulting from auricular flutter or fibrillation should not be classed as paroxysmal tachycardia. The point of origin may be in the auricles, auriculo-ventricular tissue, or ventricles.

The attack starts and ends abruptly, followed by a brief pause. During the continuance of the paroxysm the rate is regular. The original rhythm of the heart is resumed, but there may be some irregularity or an occasional premature contraction for six or eight cycles before usual rhythm is restored. Attacks last a few minutes or hours, depending upon the duration of the irritability of the focus.

AURICULAR FLUTTERS

Paroxysmal attacks of rapid heart action may occur through the mechanism of auricular flutter. The feature of this condition is a wavy up-and-down movement of the base line at about one-fifth second intervals. This is the result of auricular activity and R waves are often superimposed upon these waves. They are best seen in leads 2 and 3. The base line lies midway between the peak and the trough of the P waves. The auricles appear to have no diastolic period, as the deflection must result from only a small part of the auricle relaxing.

The auricular rate varies in different records from 240 to 310. Pressure on the right or left vagus in the neck invariably causes a slowing of the ventricular rate when flutter is present. Very little effect is noted on the auricular rate. A 2-1 relation is usual, but may be 3-1 or 4-1, or irregular responses result, depending upon the condition of the auriculoventricular bundle. If there are two or more auricular beats which fail to excite ventricular response, then there

must be disturbance of the auriculoventricular bundle. There is no relation between auricular flutter and auricular tachycardia. Flutter is a more marked disturbance. The rate of auricular tachycardia is nearly always less than 200, while in flutter it is nearly always 240 or more. In flutter the waves are nearly all the same, differing from the variability of waves in auricular tachycardia. The mechanism of flutter is explained by circus contraction, as seen also in auricular fibrillation, with possibly a physiological condition of the muscle that causes a delay of the spread of contraction and a slowing of the auricular rate.

AURICULAR FIBRILLATION

Paroxysmal attacks of rapid ventricular rate may result from fibrillation of the auricles, but auricular fibrillation is usually a permanent condition. In either case the ventricles beat irregularly.

Typical characteristics of the electrocardiogram in this condition are:

1. Absence of a wave of constant form preceding the ventricular contraction. This might be a P wave.

2. In the interval between ventricular complexes a series of small waves, varying in height and width, occur, but not at regular intervals before the Q-R-S. These small waves constantly change form and at times there may be a movement of the base line. In auricular flutter the waves occur regularly and hold a constant height and are uniform. The auricular rate varies around 300. The height of the waves depends roughly on the factors controlling the height of P waves in general. They are usually large in mitral disease and small in advanced myocardial disease. During fibrillation of the auricles there is not sufficient muscular contraction to cause variation in pressure within the auricles. The theory of circus contraction is regarded as explaining auricular fibrillation as it does auricular flutter. In auricular fibrillation the refractory period of the auricular muscle is greatly decreased, and thus the waves travel much more rapidly over the auricle.

The ventricular responses in auricular fibrillation depend upon the number of effective impulses which are passed to the ventricles by the auriculoventricular bundle. The integrity of the auriculoventricular bundle is a very important factor in determining the rate of Q-R-S. It is the usual thing for the ventricular rate to be close to the maximum it could attain, considering, of course, the refractory period. Pressure on the vagus, digitalis, and disease of the bundle will influence the ventricular rate. Irregularity is not apparent when the rate is over 120 or less than 75. Cases that are fibrillating with a rate of 75 or less have either a vagotonia or impairment of the auriculoventricular system.

If fibrillation be present, and the ventricular rate slow and regular, then complete block is also present. Aberrant ventricular complexes, like those of premature ventricular contraction, frequently are present when the rate is rapid.

VENTRICULAR FIBRILLATION

The ventricles may, under certain circumstances, take on the same incoordinated activity as the auricle. If this condition persist more than a few seconds, death is inevitable, as the ventricles do not contract in an orderly manner and no blood is propelled into the system. It is probable that ventricular fibrillation is the cause of death in patients dying from embolism or thrombosis of the coronary artery and also in those who die of acute dilatation of the ventricles. These two conditions do cause ventricular fibrillation. The waves bear some relation to auricular fibrillation, but are larger. Some waves suggest premature ventricular contraction waves. Usually ventricular fibrillation ends in death, although some cases have recovered normal rhythm.

Ventricular fibrillation occurs experimentally; as the result of different intoxications, such as pneumonia, chloroform, and asphyxia; in severely failing hearts; and in coronary occlusion. Clinically, it is rarely recognized.

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SIPPY TREATMENT FOR PEPTIC ULCER IN NAVAL HOSPITALS

By A. E. BRUNSCHWIG, Lieutenant (Junior Grade), Medical Corps, United States Navy

The Sippy treatment for peptic ulcer is but one type of medical management devised for this condition. Its popularity is widespread, especially in this country. There are, however, able internists who do not approve of this type of ulcer management, and many of their objections are well-founded statements of fact. On the other hand, the numerous failures in permanent or temporary relief from peptic ulcer that are ascribed to the Sippy treatment are not all justified, because in the great majority of these instances this régime was never carried out in all its important details. Simply confining the patient to bed and administering bland diets, alkaline powders, and milk and cream, according to some haphazard scheme, does not constitute Sippy treatment. The medical officer, therefore, should

thoroughly acquaint himself with all details concerned in the Sippy management that he may actually apply those principles upon which this treatment was devised to the fullest possible extent. (Consult Oxford Medicine, Vol. III, p. 152.)

The underlying principles of the Sippy régime are twofold:

(1) To put at rest the stomach and duodenum. (2) To favor healing of the ulcer by preventing its contact with acid—proteolytic gastric juice. To be sure, the necessary adjunctive treatment must be given, such as removal of foci of infection, intravenous therapy in coexisting syphilis, adrenalin for asthmatic attacks, and so forth. The stomach and duodenum are put at rest by the carefully supervised diet. Only liquids are given at first and then semisolid foods are slowly and gradually added. Nothing is allowed that may be chemically or mechanically irritant. Furthermore, in a great percentage of patients presenting peptic ulcer it will be found that physical exertion aggravates epigastric distress, while rest will relieve this. Hence the reason for an initial period of rest in bed. Rest for the body as a whole is a valuable adjunct to rest of the stomach and duodenum. Absolute rest in bed, even to use of the bedpan, would not be exaggerated treatment and was practiced on Sippy's own hospital service. In the case of an enlisted patient whose pain has been relieved and who feels very well after three or four days in bed, it is very difficult to enforce absolute bed rest. Going to the "head" and tarrying a few moments at the bedsides of friends or walking about the ward a few times a day to attend to minor personal needs may not appear to be appreciable physical exertion. Nevertheless, when these things are tolerated they constitute a serious digression from the Sippy régime.

The second factor enumerated above, that of protecting the raw ulcerating surface from the acid, proteolytic gastric juice is all important. This is accomplished by administration of alkaline powders, alternating at half-hour intervals throughout the day with a mixture of milk and cream. Alkalinized gastric juice is nonirritating and not proteolytic. It is an unfortunate, yet no doubt frequent occurrence, for medical officers to order similar amounts of powders and milk and cream for all cases of peptic ulcer. The dosages of the original Sippy powders were determined after much study of gastric secretion in a large series of cases. They serve the purpose of neutralizing the acidity in most instances, but were meant to be modified to suit each individual case.

It is well known that peptic ulcer is accompanied by hypersecretion and hyperchlorhydria. This varies greatly in different patients. A patient, therefore, who begins a course of Sippy treatment must have his stomach aspirated at various times on several days and the contents tested for free acidity. When this is found, the powders and

milk and cream must be increased. Not only must acidity be neutralized during the day, but also during the night—for the gastric glands are constantly secreting. Each ulcer patient should receive routinely a powder at 7.30, 8, 8.30, and 9 in the evening. During the first few days of treatment the stomach should be pumped out at midnight, or at 1 or 2 in the morning, and the contents likewise tested for free acidity. If this be found, the necessary powders should be prescribed once, twice, or three times during the night.

Aspiration of the stomach in order carefully to control free acidity, is, unfortunately, rarely performed. It may be argued that this procedure is not necessary, since free acid coming in contact with the ulcer will cause the patient to complain of pain, and that upon this sign may depend increasing the dosage of powders and milk and cream. It is true that in a large percentage of cases pain will develop under the above conditions and be relieved when sufficient alkali is administered. It is by no means a rule, however, as acid, proteolytic gastric juice may be gradually digesting a denuded ulcerating area without causing any subjective symptoms whatsoever. Examples of this are cases in which perforation or hematemesis are the first signs of ulcer.

As important as any other single factor in the Sippy treatment is the time element. Ulcers of the stomach, or duodenum, do not heal readily, even though conditions are made as favorable as possible. For this reason treatment must continue for a long time. The diet at the end of the first four weeks has been gradually increased to include a more or less regular fare of the blander foods. Powders and milk and cream must continue to be administered every half hour during the day. Sippy advocated that they should continue for 10 weeks from the onset of treatment, followed by a 6-day rest, with resumption for another 6 weeks, followed by a second rest period of 6 days, and then again continued for 6 weeks or more—a total of at least 22 weeks. If X-ray examination indicates insufficient healing or clinical symptoms reappear when alkalies and milk and cream are finally withdrawn, there should be no hesitancy in reinstituting treatment for a longer period. If in those patients who have received true Sippy management and who exhibit early recurrence the histories be reviewed, it will be found that in most cases powders and milk and cream were not taken over a sufficient length of time.

In naval hospitals patients may be easily given the full advantages of about four weeks' Sippy management. But all men from active duty in whom a diagnosis of peptic ulcer has been made can not practically be kept for five months or more on the sick list when after the initial period of rest in bed they appear perfectly well and do not complain. The civilian and military patient may benefit alike at the start from this type of treatment. After hospitalization

the civilian returns to his previous occupation. He eats three meals a day according to the directions of his physician and carries to work with him a thermos bottle full of milk and cream, and his powders, to be taken alternately at half-hour intervals throughout the day. This is especially practicable if the patient is an office worker or engaged in other types of sedentary occupation. The enlisted man, on the other hand, discharged from the hospital, free from pain since the beginning of treatment, is sent to duty, where no special type of diet is obtainable, and where it is impossible to get milk and cream and powders every half hour.

The question of the value of the Sippy régime for the service then presents itself. The fact that it is impractical to carry it out from the standpoint of length of treatment is no reason for not instituting it at all. At this time there is no other type of medical management for peptic ulcer that is superior to the one devised by Sippy, although the latter leaves much to be desired. Four or five weeks, even, of Sippy treatment will benefit most cases of peptic ulcer to some degree. The important detail of controlling gastric acidity by frequent aspirations must be carried out. The patients seen in military hospitals (exclusive of Veterans' Bureau patients), young men in good physical condition who have had relatively few attacks of pain, constitute the best class of patients for medical treatment.

While the question of medical versus surgical treatment of peptic ulcer has not been decided, condemnation of medical treatment should not be made upon experience obtained in military hospitals for the reasons enumerated above. Medical officers in instituting Sippy treatment should do so with full knowledge of the limitations placed upon such procedure by the exigencies of the service.

CLINICAL NOTES

MULTIPLE OSTEOMATA

REPORT OF CASE

By W. H. WHITMORE, Lieutenant Commander, and O. A. SMITH, Lieutenant (Junior Grade), Medical Corps, United States Navy

This case is reported because of the comparative rarity of multiple osteomata. Seventy-two distinct bone tumors were counted; some of these appeared to have more than one center, so that the actual number of tumors may be greater.

True osteomata are comparatively rare. Bone is often found in tumors of the connective tissue group as a secondary or complicating development—osteofibroma, osteochondroma, osteosarcoma, etc. It may occur in muscles and fasciæ, in consequence of repeated trauma (rider's bone) or as the result of a peculiar inflammatory process (myositis ossificans) or in connection with chronic inflammations of the brain, pericardium, skin, kidneys, aorta, and other places. In order to constitute an osteoma the bone must show independent growth and not be of inflammatory origin.

Bony outgrowths projecting from the surface of a bone, and frequently of inflammatory origin, are called osteophytes or exostoses; similar masses in the substance being known as enostoses.

Osteomata, like bone, may be divided into two varieties, the cancellous and the compact. The cancellous osteomata, which comprise the great majority of bone tumors, occur in young, growing subjects at the end of the diaphysis close to the epiphyseal line. Boyd says they almost certainly originate as a piece of the epiphyseal cartilage which has become separated and then ossified. They may arise in soft parts, the usual site being the upper end of the humerus, the lower end of the femur, and upper end of the tibia. As a rule their growth is slow. The compact osteoma, often called an ivory exostosis, is an extremely hard sessile tumor, usually growing from the vault of the skull. It usually originates in the frontal and ethmoidal sinuses and may invade the orbit.

Osteomata show the architecture of normal bone, i. e., a demarcation into a cortex and medulla and are benign tumors growing from the cortex. The borders are clear-cut and definite. They push aside soft tissues, are painless, but mechanically interfere with motion.

REPORT OF CASE

E. P., private, United States Marine Corps, age 23, single, native of Alabama, was admitted to the United States naval hospital, Norfolk, Va., on January 18, 1927; diagnosis, hemorrhoids. He was operated upon and cured of that condition January 25, 1927.

During a routine physical examination it was noted that he had numerous prominent bone tumors. He had previously made no mention of this condition to any medical officer. It was not noted on enlistment and there were no notes in his health record in regard to any abnormality except "varicose veins back of both legs."

The patient thought he was normal until he was rejected for enlistment in the Army in August, 1925. He says he was rejected because of the shape of his legs. He enlisted in the Marine Corps August 14, 1925. In October, 1926, he began to have pain in the region of the left scapula, especially at night. This pain was severe enough to keep him awake. He describes the pain as being a sensation of numbness. It has gradually become more severe, though it has never been acute. Recently the left shoulder has become quite weak. For the past few weeks he has been rather weak in his knees. He says he has always been rather weak in his arms, and his associates have noticed that he is not so strong as his general appearance would indicate.

Family history.—Negative, except that his mother had gallstones.

Past history.—Born in Missouri, but has lived in Alabama since early childhood. Diphtheria, mumps, whooping cough in childhood. Influenza, 1918. Fracture, eighth, ninth, and tenth ribs in childhood. Hemorrhoidectomy, January 25, 1927. He made an uneventful recovery from all previous diseases and conditions. Denies all venereal diseases.

Habits.—Has never used alcohol, drugs, or tobacco.

Occupation.—Before enlistment he worked on a farm and as a railroad switchman. He was able to do his share of work on the farm. He worked on the railroad three months; he also worked in a steel foundry shoveling sand. His duties in the Marine Corps have been largely guard duty.

Physical examination.—Height, 72 inches; best weight during summer of 1926, 192 pounds; present weight, 182 pounds.

The patient is a normal, healthy individual except for the following:

Right clavicle.—The sternal end is unduly prominent.

Ribs.—Peanut-sized tumors felt on eighth and tenth ribs at anterior axillary line.

Right scapula.—The vertebral border is unduly prominent and the surface is roughened. A peculiar grating sound can be heard on motion of the shoulder joint.

Left scapula.—Essentially the same as the right.

There is some limitation of motion in both shoulder joints, patient being unable to place finger tips on shoulders.

Right humerus.—Small tumors about 2 centimeters in diameter felt on inner side at beginning of lower third. Near lower end of upper third, on the inner side, is a rough bony growth, about 5 centimeters long.

Left humerus.—Just within the axilla is felt quite a large, rough growth about 8 centimeters in diameter.

Right radius.—There is an abnormal curve just above the wrist joint. Supination is limited.

Left radius.—A slight curve of the shaft is noted.

Right femur.—At the lower end and outer side is felt a rounded, rough tumor about 4 centimeters in diameter.

Left femur.—Due to a growth about 4 centimeters in diameter at the lower end and inner side of the femur there appears to be an outward bowing of this bone.

Right tibia.—Below the internal tuberosity is a rough growth, with two prominences about 4 centimeters long.

Left tibia.—Essentially the same as the right.

Motion of both ankle joints is limited, but more so in the left ankle.

Laboratory examinations.—Urine: Amber, acid, specific gravity, 1.031; negative for albumin, sugar, and Bence-Jones proteins; occasional pus and epithelial cells and a few amorphous urates. Blood: Kahn test, negative; calcium, 11 milligrams per 100 cubic centimeters; coagulation time, $3\frac{1}{4}$ minutes; hemoglobin (Dare), 84 per cent; red-blood cells, 4,310,000; white-blood cells, 7,750; polys, 66 per cent; S. lymph, 28 per cent; L. lymph, 4 per cent; eos, 1 per cent; mast cells, 1 per cent.

A series of Röntgenograms was made, including all bones of the body. Multiple bone tumors were found, a total of 72, ranging in size from about 0.2 to 7 centimeters. The tumors involve mainly the long bone, but several are in the scapulæ. The tumors originate from the cortex, or subperiosteal layer, and appear to be covered with periosteum. There is definite new-bone formation in the tumors. The bone cortex beyond the tumor limits is normal; there is no sign of invasion. Where muscles and fasciæ are attached there are exostoses, but in other parts the tumors are rounded or irregularly lobulated. The exostoses appear to be secondary developments. The tumors are of the benign type.

Röntgen diagnosis: Multiple osteomata and exostoses.

DETAILED REPORT OF EXAMINATION

Skull.—No tumors noted in bones of cranium and face. The sella turcica is large but within the normal limits of size.

Spine.—Vertebrae appear normal, no tumor formations noted.

Ribs.—On the right third rib there is a small bone tumor near the neck; in a corresponding position on the left third rib there is a smaller bone tumor.

Right clavicle.—Enlargement near sternal end.

Left clavicle.—Small, rounded tumor near sternal end.

Right scapula.—On vertebral border there are two small rounded bony tumors, one near the angle, the second about the middle of the vertebral border.

Left scapula.—On vertebral border, upper end, there is an irregular bony tumor; at the middle of the vertebral border there is a small, round tumor; on the glenoid process, below the glenoid fossa, there is a small irregular bone tumor, of exostosis type.

Right humerus.—At upper end, in region of epiphyseal line, there are three irregular bone tumors, and the entire upper end of the shaft appears irregular, apparently due to multiple areas of bone proliferation. On the inner surface of the shaft, above the middle third, there is a small exostosis formation.

Left humerus.—The upper third of the shaft appears enlarged and irregular due to multiple tumors; on the anterior border, below the epiphyseal line there is an irregular tumor, about 3 by 7 centimeters; the lower end of the tumor resembles an exostosis. On the posterior surface of the shaft, at the epiphyseal line there is an irregular tumor with an exostosis projecting downward. At lower end of humerus, on anterior surface, there is a small exostosis.

Right radius.—Small, irregular tumor at neck; at lower end, a small, irregular tumor at epiphyseal line. The shaft of right radius is abnormally curved.

Left radius.—Head of left radius appears enlarged, without definite tumor; small tumor at lower epiphyseal line; the shaft is abnormally curved.

Right ulna.—Small tumor at base of olecranon process. On internal border in lower third there is a small, irregular proliferation of bone. The lower articular surface of this bone is missing, and the end of the bone is irregular.

Left ulna.—Small tumor on internal side at base of olecranon; there is a large, irregular tumor at lower end of left ulna; the articular surface is very small.

Carpal bones.—No tumors.

Hands.—On several of the metacarpals and phalanges there are small tumors about 1 millimeter in diameter; a total of 17 such tumors in the two hands.

Pelvis.—No abnormalities.

Right femur.—On inferior margin of neck there is a small rounded tumor; on the external surface of the shaft below the greater tuberosity there is a small, irregular tumor. At the lower end of the shaft there is a tumor involving the condyle, with an exostosis extending upward. On the outer surface of the shaft above the external condyle there is a rounded subperiosteal tumor. On the posterior and anterior surfaces there is marked irregularity with exostosis formation.

Left femur.—On the inferior border of the neck there are two irregular tumors, the lower one extending downward to the lesser tuberosity. At the inferior extremity there is a large irregular tumor, with an irregular exostosis extending upward. On the external surface there is a long pencil-like exostosis; on the anterior and posterior surfaces there are irregular exostoses. The articular surfaces appear normal.

Right tibia.—Below the internal tuberosity there is an area of irregular bone proliferation, with an exostosis extending downward. At lower end of shaft on internal surface there is a small exostosis; on external surface there is a large irregular tumor which presses against the fibula.

Left tibia.—Below the internal tuberosity there is an irregular tumor mass, projecting downward. At the lower end there is a small tumor pressing against the fibula. On the posterior surface, below the upper end, there is an exostosis; near the lower end there is an irregular tumor.

Right fibula.—There is a large, irregular, roughly rounded tumor at the head, with an exostosis below it. At the lower end, on internal surface, there is a small tumor. The lower end of the right fibula is partly destroyed by pressure from a large tumor in the tibia.

Left fibula.—At the upper end there is a small exostosis extending downward from an irregular tumor.

Tarsal bones.—No tumors.

Metatarsals and phalanges.—Multiple small tumors; a total of 11 in the feet.

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LOCAL ANESTHESIA IN EYE, EAR, NOSE, AND THROAT WORK

By F. L. Young, Lieutenant Commander, M. C., V. (G), United States Naval Reserve

Local anesthetics have been used by some eye, ear, nose, and throat specialists for many years, though it is only within the last 10 or 15 years that practically all such specialists have been using them.

To-day, many specialists use local anesthetics for their minor operative cases, still reserving the general anesthetics for their major operations.

During the last eight years I have advised local anesthesia in all operative cases where the patient was over 12 years of age, with the exception of the major ear cases. In 98 per cent of these cases local anesthesia has been used and in not one case do I regret having used it. This type of anesthesia has been used by me in 98 submucous resections of the nasal septum, 8 Canfield antrum operations, 12 Sluder ethmoid-sphenoid sinus operations, 912 tonsillectomies, 76 tympanotomies, 84 Douglas punctures of the antrum, 10 eye enucleations, 14 intracapsular cataract operations, 26 iridectomies, 88 pterygium operations, 4 tarsectomies, 10 plastic operations of the face, etc.

In all major operations on the eye, nose, and throat, performed under local anesthesia, a hypodermic of morphine, one-sixth grain, and hyoscine, one two-hundred-and-fiftieth grain, is given 30 minutes before operation to adult patients; children receive smaller doses in accordance with their age and size.

To the nervous patient, the cardiac patient, the bedfast patient, the irritable patient, and the youngsters, this is almost a godsend.

It allays their fears, quiets the nervous system, makes them drowsy and sleepy, controls post-operative pain for from 6 to 24 hours, and prevents practically all shock.

I have found that this hypodermic medication has a decidedly beneficial effect in controlling operative and postoperative hemorrhage, especially in all nose and throat operations. The nose and throat become dry, there is no oozing of blood, and the secretion of mucus and saliva is greatly diminished for hours. The operative field is clean and dry when looked at hours after the operation.

Much of the poor operative results in nose and throat work is due to poor anesthesia, some to a lack of experience on the part of the operator, and some to poor equipment.

Tonsillectomy is quickly and easily performed by those who have had proper training, and are properly equipped, regardless of the method of operation, provided the anesthesia is sufficient.

Too often the tonsil operation is a bloody one, pieces of tonsil are left, pillars are cut, palates are injured, and the patient is worse off than before operation.

I insist on local anesthesia in all patients requiring tonsillectomy where the age is 11 years or older.

Novocain, 1 per cent, and suprarenalin, 1/100,000, is the solution used for injection in all cases, preceded by the morphine-hyoscine hypodermic.

Six to ten cubic centimeters of this anesthetic solution is used for each tonsil; 2 cubic centimeters being injected through the anterior pillar deeply into the superior pole of the tonsil; 2 cubic centimeters lateral to the inferior pole; and 2 cubic centimeters midway between these two injections, through the anterior pillar and deep. No cocain is used for surface anesthesia, as it is not needed when the preliminary hypodermic is used. There is no need to worry about using too much novocain solution, as abdominal surgeons use from 200 to 400 cubic centimeters in splanchnic anesthesia.

In submucous resection of the nasal septum and in sinus and turbinate work a 4 per cent cocain solution will give good surface anesthesia; then with long needles, injections of novocain, 1 per cent, and suprarenalin, 1/50,000 solution, beneath the submucosa will give excellent anesthesia. In the submucous operation the submucosa will be raised and the operation can be more easily and expeditiously done.

In eye enucleations 4 per cent cocain solution will give surface anesthesia; then deep orbital injections of novocain, 1 per cent, and suprarenalin, 1/50,000 solution, will produce ideal anesthesia and also control hemorrhage. Four deep injections of 2 cubic centimeters each of the anesthetic solution, one at the internal canthus, one at the external canthus, one superiorly, and one inferiorly, are the injections used. Just recently I was called to see an old gentleman 78 years of age who had been suffering with his left eye for 10 days and was bedfast. On examination I found the eye stony hard, cornea very cloudy, no pupillary reaction, vision nil, with a history of severe pain and tenderness at intervals for the past 18 years, and blindness in the eye for the past 8 years. Diagnosis: Chronic glaucoma, inflammatory. Enucleation was advised and was done at his home the same day. Patient was given the preliminary hypodermic of morphine and hyoscine, then under local anesthesia the eye was enucleated. After the operation the patient was asked how it felt and he replied, "Very pleasant, Doctor; very pleasant."

Numbers of times I have been called to see patients with arthritis and endocarditis who were bedfast and where it was thought a tonsillectomy would aid in their recovery. In all cases they were given the preliminary hypodermic of morphine and hyoscine, propped up in bed, and the operation performed under local anesthesia without shock and with very little hemorrhage and apparent life-saving results in some cases. General anesthesia would be a great risk in this type case.

Numbers of children from 10 to 15 years of age have been brought to me suffering from valvular disease, chronic cardiac, in which there was a need for tonsillectomy and adenoidectomy, and in which general anesthesia would be contraindicated. In all these cases local anesthesia of novocaine-suprarenalin, preceded by the morphine-hyoscine hypodermic, made the operation very quickly and easily performed without any apparent shock and with very slight hemorrhage and no pain.

CONCLUSION

1. After 8 years of extensive use it has been my experience that every eye, nose, and throat operation performed on a patient 12 years of age or older can best be done under local anesthesia.

2. There is less shock, less hemorrhage, and more rapid recovery than when general anesthesia is used.

3. A hypodermic injection of morphine, one-sixth grain, and hyoscine, one two-hundred and fiftieth grain, given 30 minutes before operation has been used routinely in more than 1,200 eye, nose, and throat operations performed under local anesthesia in the last 8 years, and, without exception, it has made the operation easier for both patient and physician.

ENDARTERITIS, ACUTE, FROM ELECTRIC SHOCK

By P. F. DICKENS, Lieutenant, Medical Corps, United States Navy

Under the heading "Arterial degeneration" in Boyd's Surgical Pathology we find the following: "Here we enter upon a subject of great difficulty, confusion, and obscurity. Our ignorance regarding the nature and causation of these conditions is so great that it is but natural that we find ourselves threading our way amidst a maze of hypotheses, with only here and there a well-established fact on which we can rely, looking in vain for some general principle on which to take a stand. We hardly know if we are dealing with one or many conditions or if they should be considered primarily as degenerations or chronic inflammation." Moorehead in his book on traumatic surgery states: "Wounds and contusions may cause varying manifestations at the site of trauma, but clinically all the pathologic conditions occurring in such vessels usually arise from internal causes dependent upon altered states of the circulating blood. In this latter class fall the various inflammatory conditions, such as arteritis, periarteritis, arteriosclerosis, and the obstructive group, variously known as obliterative endarteritis or thromboangiitis obliterans. These arterial conditions are the result of disease and not of injury, and they are mentioned here because so often discovered in a routine examina-

tion called forth by some accident. This is notably true of arteriosclerosis and the thrombotic types of circulatory lesions in which the condition has ordinarily existed for years and the symptoms perhaps have been ascribed to various other ailments."

In reporting this case of endarteritis, acute (thrombosis) we do so believing that we are dealing with an endarteritis, thrombotic type, produced by lightning.

CASE REPORT

S. P. E., private in the Gendarmerie d'Haiti, age 25; admitted to the hospital on July 7 suffering from electric shock. Patient was repairing a telephone line during a tropical storm when lightning struck the wire the two ends of which he was holding. The shock was severe enough to cause him to drop the wires but not severe enough to knock him down. Later he repaired the wire, returned to his home, and suffered no ill effects from the shock except for a slight burn in the palm of both hands. A day later he began to have severe pain in the fingers of both hands and noticed that he could not completely extend his fingers. He stated he did not feel the electric shock in any part of his body except his hands. On admission to hospital the day after the injury patient was having intense pain in both hands, especially in the fingers. There was no other complaint. Examination revealed a burn of first degree in the palms of both hands where the skin was in contact with the telephone wire; slight discoloration of the skin of both hands, extending from the tips of the fingers to the middle third of the hand; and a small amount of "puffiness," extending to wrist. Unable to detect capillary circulation beneath the nails of either hand, and it was noticed that color returned slowly to parts blanched by pressure.

Anesthesia of all fingers, with hyperesthesia of the hands, was present. The fingers were flexed and any attempt to extend them caused severe pain. Radial pulse was barely perceptible.

General examination: Eyes, sclera, clear; pupils, equal and react to light and distance. Nose, throat, chest, and heart negative. Abdomen, no organs or masses palpated. Extremities, lower, circulation good. Tibial pulse good. Reflexes present and normal. Station good. G. U. system: There was a large indurated scar on penis; lymphatics, general glandular enlargement; blood pressure, 120/76; arteries, soft and pliable; urine, negative for sugar, albumen, and casts. Wassermann test, blood serum reaction positive, four plus.

The condition of the hands became progressively worse, and on July 10, three days after admission, there was definite symmetrical gangrene of both hands. Radial pulse had disappeared.

The fingers of the right hand were cold, shriveled, black, and without circulation. Total loss of sensation extended to the base of all fingers, and hyperesthesia of wrist, with edema, was present. Left hand showed dry gangrene of all fingers. No definite line of demarcation on either hand.

This man gave no previous history of pain, tingling, numbness, cramps, or other symptoms of trophic disturbances, referable to his hands. Temperature during this period ranged from 100 to 101; pulse, 80 to 90. On July 17, 11 days after traumatism, the right hand was amputated just above the wrist. No tourniquet was applied and, on incision through the skin and muscle, bleeding was markedly less than was to be expected. When the radial and ulnar arteries were cut there was practically no bleeding. Both of these arteries contained an organized clot in the proximal end for about 1 inch; distal end

was occluded by a clot. Clot was removed from proximal end, circulation established, and arteries ligated. The stump healed without complication. The left hand was amputated just above the wrist on August 5, and the condition of the arteries was the same as was found in the right hand. The stump of the left arm healed without complication.

The histopathological report on the right hand was as follows:

Section through specimen shows a marked edema associated with a diffuse infiltration with pus cells. The arteries show complete occlusion with recent thrombi. The endothelium appears definitely damaged and the arterial walls are infiltrated with leucocytes. We are of the opinion, from the above findings, that the electrical shock devitalized the inner lining of the arteries, which predisposed to early thrombosis, with the resultant gangrene.

This is believed to be the first case of endarteritis, acute, caused by electricity, to be reported.

ACUTE OSTEOMYELITIS WITH METASTASIS

REPORT OF CASE

By G. G. HERMAN, Lieutenant, Medical Corps, United States Navy

In reading the report of this case it is to be noted that the original focus of infection is not definitely established. The osteomyelitis may have been a metastasis or it may have been the original point of infection. However, the known metastases are to be found in the lung, eye, and cutaneous surfaces of the body. The first blood culture being positive for the hemolytic streptococcus, was this septicemia due to the osteomyelitis or from another less virulent point of infection; i. e., tonsils and metastasis to the tibia, or was the tibia the original infection? In this case we have the typical history of trauma which, as is known, predisposes to osteomyelitis, also a history of a previous attack of tonsillitis. The onset in this case was fairly typical; acute, with violent pain, coming on at night, appearing in the leg just below the knee, a 21,000 white count, showing 84 per cent polymorphonuclear leucocytes, without any demonstrable condition to account for his pain and leucocytosis. The writer is of the opinion that the bone involvement was the original infection and presents this case to illustrate the extensive metastasis that may follow an acute osteomyelitis. Mercurochrome was used in this case, and it is believed that the intravenous use of this drug definitely eradicated the septicemia. On September 13 a blood culture was found to be positive for the *Streptococcus hemolyticus* and intravenous mercurochrome treatment was instituted. Intravenous injections of 15 cubic centimeters of one-half of 1 per cent solution were given daily for three days, after which the blood culture was found to remain positive. The mercurochrome treatment was again insti-

tuted in the same dosage for another period of three days, after which the blood culture was found to be negative.

CASE REPORT

J. B. S., a private, United States Marine Corps, was admitted to the United States naval hospital, Parris Island, S. C., on September 9, 1926, with the diagnosis, Periostitis, acute, right tibia.

Family history: Irrelevant.

Past history: Five years ago patient had his right leg crushed between two coal cars. He was incapacitated for a period of two weeks but did not recall any bone injury. One year ago, while working in a coal mine, the patient received a lacerated wound of the middle third of the right leg, being struck over this area with an iron bar. Two years ago he had an attack of tonsillitis.

Present illness: Three days ago, without apparent cause, patient developed severe pain in the upper third of the right leg. The pain came on at night and grew progressively worse. He was admitted to this hospital with a temperature of 102, pulse 90, respiration 20. Right knee was forcibly flexed and held in that position by patient. This seemed to ease the pain. Attempts to extend the leg produced excruciating pain. There were pain, tenderness, and slight swelling of the anterior surface of the upper third of the leg, inferior to the tubercle of the tibia. Throat clear; teeth apparently in good condition. Heart, lungs, and abdomen negative. No bone pathology demonstrable by a Röntgenogram, nor was there a roughening or elevation of the periosteum. White count, 21,000; differential count showed 84 per cent polymorphonuclear leucocytes.

Operation: Incision at the point of greatest tenderness showed periosteum and surface of bone apparently normal. Tibia was drilled and pus escaped under pressure. Due to the lapse of time between the onset of symptoms and the operation, the medullary cavity was freely opened and curetted. Pus from the wound showed a hemolytic streptococcus infection. Diagnosis of acute osteomyelitis was made. Free drainage was established, but the patient's general condition became progressively worse.

On September 13, 1926, temperature was 103, pulse 120, respiration 36. Examination at this time showed diminished excursion of the right chest, with considerable embarrassment of respiration. Vocal fremitus markedly increased in left lower lobe. Percussion note dull to flat in right mid to lower lobe; somewhat impaired in left lower lobe. Whispered voice increased over same area. Moist and bubbling râles heard over right mid and lower lobes. Patient complained of considerable pain in chest below sternum and along costal margin. Abdomen soft and no masses or organs palpated. Wound of tibia draining.

The diagnosis of lobar pneumonia was made and the patient was reported as being in serious condition. Blood culture was made and found positive for the hemolytic streptococcus. Patient was given 15 cubic centimeters of one-half of 1 per cent solution of mercurochrome intravenously; repeated on the following two days. There was a moderate reaction coming on four hours after the injections, temperature rising from 2° to 3°, pulse dropping about 10 beats per minute. Following the three intravenous doses of mercurochrome the patient's general condition showed some temporary improvement. Blood cultures, however, remained positive for the hemolytic streptococcus and the diagnosis of septicemia was made. Condition again grew progressively worse and, on September 30, 1926, was considered critical; patient at times becoming irrational. Respiration somewhat of the Cheyne-Stokes type. Organized

blood clots were found in the sputum and smears from these showed the *Streptococcus hemolyticus*. Right leg showed fluctuating masses on either side of operative wound, with large mass below patella. Fluctuating areas were incised and considerable pus evacuated. Smears were positive for hemolytic streptococci. Blood culture was again positive for the same organism. Patient at this time began to complain of blurred vision. Examination revealed a palpebral and ocular conjunctivitis in both eyes, with a slight haziness of the cornea and some clouding of the media. White count, 57,150; polymorphonuclear leucocytes, 95 per cent; lymphocytes, 5 per cent. Blood smear showed a marked polymorphonuclear leucocytosis and varied from the normal in several ways: (1) Many nuclei of immature type, (2) large granulations, (3) cells friable, (4) cells vacuolated and suggestive of fatty degeneration. Red cells showed some basophilia; normoblasts and myelocytes present. Picture suggested active regeneration in response to an acute infection. Mercurochrome, 15 cubic centimeters of 1 per cent solution, was given intravenously on three successive days, with a moderate reaction following each injection. Lung condition now gave signs of clearing and wounds of leg showed marked improvement. Eye condition became progressively worse; ocular and palpebral conjunctiva edematous, globes bulging. Lids could not be closed due to bulging tissues. Cornea cloudy. Anterior chamber showed a yellow discoloration, apparently purulent, and light reflex was absent. Patient was unable to distinguish between light and darkness. Aspirating needle failed to reveal pus in tissue surrounding globe. Impression of cavernous sinus involvement. On October 6, 1926, patient's condition had again become critical. Blood cultures of October 3, 1926, negative. All areas of infection had responded to treatment except the eyes. Incision in tissues above and below each globe revealed equal amounts of pus. On October 10, 1926, examination of the eyes showed marked edema of the lids and ocular conjunctiva, with an extreme degree of exophthalmos, the eyes lying upon the cheeks. The picture was one seen in infective thrombosis of the cavernous sinus. Corneae in both eyes were opaque, dry, and shriveled. Patient had been totally blind for a period of two weeks. Diagnosis of panophthalmitis established.

The patient remained in a critical condition and it was the consensus of opinion of the staff that the only means of preventing death was the removal of the only remaining focus of infection, namely, the eyes. Enucleation of both eyes was performed under chloroform anesthesia. The wounds were irrigated and packed with iodoform gauze.

Gross examination of the removed eyes showed corneae opaque and irides adherent. Marked thickening of the coats. Vitreous replaced by purulent material containing organized blood clots.

Microscopical examination showed the regular relation of the parts to be destroyed and distorted. Sclera: Fibers shrunken and distorted, infiltrated with a few lymphocytes and polynuclears. Cornea: Sloughing of the epithelial layers with many areas in which the cell nuclei do not stain. Infiltration of the entire substance with many poly and mono nuclear cells; also a few red blood cells. Choroid: All layers are distorted and the relations lost. Blood vessels are dilated and in places filled with a light staining homogeneous substance. Tissue is infiltrated with many polynuclear cells and there is a marked hemorrhage into it. Retina: Pigment layers are all piled up and show no uniformity except in isolated patches; pigment looks as if it were increased. The same infiltration with polynuclears, mononuclears, and red blood cells occurs in this layer. In the vitreous chamber, hemorrhage has occurred,

and a deposit of thin fibrinous strands has taken place in the interstices, in which there are many red blood cells indicating hemorrhage. Also innumerable polynuclear cells and some lymphocytes. Pathological diagnosis: Panophthalmitis.

There were many small superficial pustules on the buttocks, back, shoulders, and lower extremities. The pustules continued appearing in successive crops for a period of six days. Following the enucleation, the patient's condition began to show the first improvement. The temperature and pulse rate began to approach normal. Convalescence was slow but steady. The skin infection responded to treatment, but the area around the knee and the original site of infection remained refractory to treatment and showed evidence of abscess formation. On October 31, 1928, the patient had sufficiently recovered to permit of his transfer to the United States naval hospital, Washington, D. C., for further treatment, especially that of fitting artificial eyes.

ABDOMINAL HODGKIN'S DISEASE¹

REPORT OF CASE

By W. D. C. DAY, Lieutenant (Junior Grade), Medical Corps, United States Navy

Hodgkin's disease, now known also as generalized lymphadenoma, malignant lymphoma, lymphogranulomatosis, pseudoleukemia, and anemia lymphatica, is a disease characterized by enlargement of lymph nodes and progressive anemia, with a tendency toward remissions, and terminating fatally.

The disease is widely spread and occurs more commonly in young adult males. The cause is unknown, although it is probably infectious. A diphtheroid organism has been isolated. The most outstanding predisposing factor is probably focal infection.

Pathologically there is extensive involvement of the superficial lymph nodes, which usually begins in the cervical nodes. There may be an extension from one node group to another, involving the mediastinal and retroperitoneal groups. Early the nodes are soft, later hard, and they always tend to remain discrete. The capsule may be infiltrated and adjacent structures involved. It is the rule for the spleen to be enlarged and the liver is also often enlarged and may present scattered nodular tumors. On section the nodes are grayish white or yellow, firm, and show strands of fibrous tissue. Microscopically the picture is made up of a thickened fibrous reticulum, endothelial cells, eosinophiles, and Dorothy Reed cells.

Symptomatically the disease may show only enlargement of the lymph nodes, progressive anemia, and, toward the end, marked emaciation and great asthenia. However, the disease may be manifest in several forms with a symptomatology peculiar to each type. In the latent type, or internal form, there are usually more marked

¹ From U. S. Naval Hospital, San Diego, Calif.



FIG. 1.—MULTIPLE OSTEOMATA. LEFT SHOULDER



FIG. 2.—MULTIPLE OSTEOMATA. RIGHT SHOULDER

886-1



FIG. 3.— MULTIPLE OSTEOMATA. FOREARMS



FIG. 4.—MULTIPLE OSTEOMATA. HIP JOINTS

886—2



FIG. 5.—MULTIPLE OSTEOMATA. ANTERO-POSTERIOR VIEWS OF KNEES



FIG. 6.—MULTIPLE OSTEOMATA. LATERAL VIEWS OF KNEES

886—3



FIG. 7.—MULTIPLE OSTEOMATA. LEGS

886—4



FIG. 1.—ENDARTERITIS, ACUTE. THROMBOSIS, CAUSED BY LIGHTNING. NECESSITATED AMPUTATION OF BOTH HANDS ABOVE THE WRIST

886—5



FIG. 1.—ABDOMINAL HODGKIN'S DISEASE. LIVER
SHOWING INVASION IN AND AROUND PORTA
HEPATIC



FIG. 2.—ABDOMINAL HODGKIN'S DISEASE. SPLEEN,
SHOWING SCATTERED NODULAR TUMORS

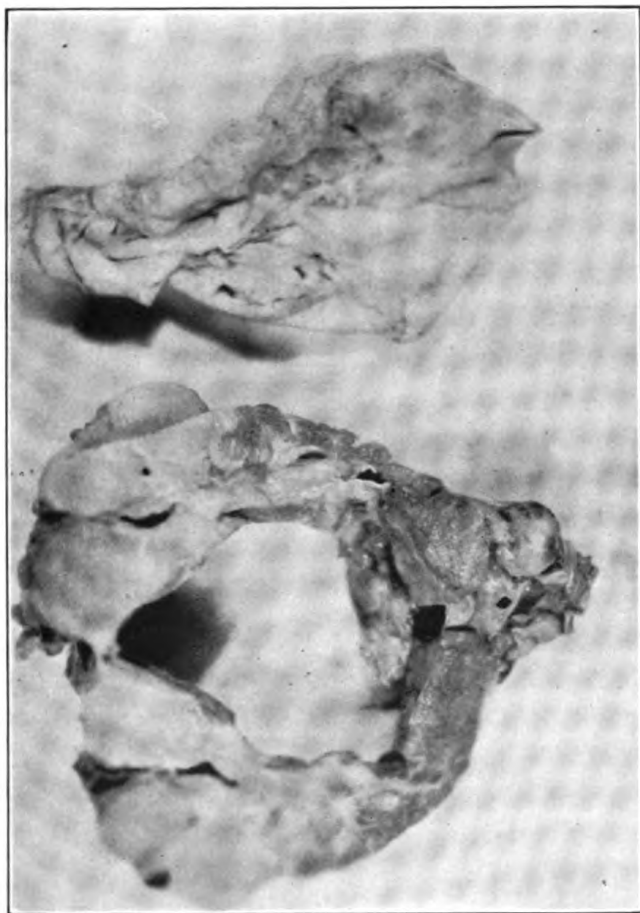


FIG. 3.—ABDOMINAL HODGKIN'S DISEASE. TUMOR
MASS INVOLVING HEAD OF PANCREAS

886—7

constitutional symptoms, with fever and anemia, and the disease runs a malignant course. In some cases there is a relapsing pyrexia, the so-called Pel-Ebstein crisis. These fever crises are generally attended with swelling of the nodes and an increase in all symptoms. During the periods of apyrexia the nodes may subside and the patient be remarkably free from any symptoms. The disease may present itself in an acute form and terminate fatally within a few months.

CASE REPORT

G. W. K. (V. B. P.); aged 35 years. Admitted to hospital on February 2, 1927, as with Banti's disease.

Complaint.—Weakness, enlargement of glands on left side of neck, loss of weight, jaundice, some enlargement of abdomen, and slight pain in epigastrium.

Family history.—There was no tuberculosis, cancer, nor any other familial disease tendency.

Past personal history.—Usual childhood diseases with good recovery. Denied any venereal disease. Had had no injuries or operations. Occupation, that of a miner and contractor. Close questioning showed the patient to have been symptom-free prior to the onset of the present condition.

Present illness.—Began in July, 1925, with a feeling of being under par and an enlargement of nodes on left side of neck. Patient thought condition was due to some carious teeth, and these were extracted. He kept on at work, but in March, 1926, consulted a physician, who treated him for tuberculous adenitis with the X ray. The nodes subsided readily under this treatment, but the patient gradually lost ground and noticed that the abdomen was enlarging. Had some fever of an intermittent type, anorexia, and also a moderate jaundice. Took to bed in May, 1926, from which time he has progressed steadily downward with no new symptoms other than great asthenia and marked emaciation with, recently, some pain in epigastrium.

Physical examination.—White male, age 35, moderately jaundiced, markedly emaciated, with a dry, tender skin. There was some edema of feet and hands. Cervical adenitis on left, glands discreet and forming chains; also slight inguinal adenitis. Temperature, 100° F.; pulse, 120; respiration, 20. Sclera icteric. Pupils equal, regular, reacted to light, and in accommodation. Teeth in poor condition and mucous membrane of fauces pale. Papillae of tongue atrophic. Tonsils atrophic and imbedded.

Thorax.—Normal shape. Normal, equal mobility. There was normal resonance throughout. Breath sounds normal. No râles. No friction rubs. The heart sounds were very distant. Heart boundaries within normal limits. No thrills nor murmurs. Rhythm slightly irregular. B. P. 115-90.

Abdomen.—Full and tender, with the general rigidity of emaciation. The spleen was palpable beneath the left costal margin and extended superiorly to the sixth intercostal space in the anterior axillary line. The liver was greatly enlarged. Superior limits appeared to be normal but inferiorly it extended 7 to 9 centimeters below right costal margin. The surface was distinctly nodular. There was moderate ascites.

Laboratory examination.—Red blood cells, 3,500,000; white blood cells, 18,000; hemoglobin 65 per cent; differential count—neutrophils, 56 per cent; lymphocytes, 43 per cent; large mononuclears, 1 per cent. Kahn test, negative. Urine: Negative for sugar, albumin, casts, pus, blood; positive for bile; nega-

tive for melanin. Van den Bergh showed a positive direct reaction and an immediate indirect reaction. Stools negative.

Course of disease.—The patient progressed rapidly downward. A few days after entrance his temperature came down to normal, and even subnormal, and ran along in this manner for about 10 days, after which the patient had a typical paroxysm of fever. During the interval of apyrexia the liver receded in size and the nodules were not palpable. During the paroxysm all symptoms were exaggerated; enlargement of internal organs being more marked and accompanied by pain. Jaundice and ascites also increased. The blood picture never showed anything characteristic with the exception of a moderate secondary anemia. Shortly before death a node was removed from the neck, which on microscopic section confirmed the diagnosis of Hodgkin's disease. X-ray examination of the chest at about this time showed entire right side to be filled with fluid and a density suggestive of a metastatic malignant involvement.

Post mortem findings.—The body has been embalmed. It is that of a quite emaciated male of 35 years. Slight jaundice, edema of feet, and distention of abdomen. There are numerous palpable cervical glands.

Permission not obtained to open thorax.

Abdomen.—There was 2,000 cubic centimeters of straw-colored ascitic fluid. Behind the stomach is a large nodular mass of firm gray-white tissue. This mass extends into the liver anteriorly and to the vertebral column posteriorly, including and largely replacing the head of the pancreas. Passing through it are the common bile duct and inferior vena cava. Retroperitoneally and to the right the adrenal gland and perirenal tissues are fused into the mass. The liver is enlarged, weighing 2,644 grams (normal, 1,500). Much of the parenchyma is replaced by irregular masses of white tissue. The gall bladder also shows a white nodule. The spleen is enormously enlarged, weighing 1,135 grams (normal, 175). It is extensively invaded by the nodular masses of the specific tissue. The retroperitoneal lymph nodes are greatly enlarged (to 3 cm.) and are quite firm. The mesenteric nodes are involved to a lesser extent.

The tumor and metastases present the same microscopical picture—a reticulum in which lie small lymphocytes, large lymphocytes, endothelioid cells, many eosinophiles, and Dorothy Reed cells. There is marked fibrosis, the connective tissue being arranged in bands and masses.

Pathological diagnosis.—Hodgkin's granuloma.

COMMENT

This case is of interest from a standpoint of differential diagnosis. The picture was very suggestive of some intraabdominal malignancy of the stomach or of the pancreas with metastases to the liver and elsewhere.

Other conditions from which it had to be differentiated were the splenomegalies, lymphosarcoma, hypertrophic biliary cirrhosis, and tuberculous involvement of the abdominal viscera and peritoneum. However, from the following facts the diagnosis was fairly certain prior to biopsy of a node.

1. Occurrence in a young adult male who had had no gastrointestinal symptoms.
2. Primary involvement of lymph nodes on one side of neck, which nodes subsided readily with X-ray therapy.

3. Presence of typical fever paroxysms, the so-called Pel-Ebstein crises, alternating with periods of apyrexia.

4. Periods of quiescence in which nodular enlargements would subside.

5. Intense pruritis associated with jaundice and ascites.

6. Nothing characteristic about the white blood count.

As to treatment there is nothing to be used from a curative standpoint. Temporary relief may be obtained by deep Röntgenotherapy and the administration of small doses of arsenic.

The condition progresses invariably, regardless of treatment, to a fatal termination.

REFERENCES

1. Osler, Principles and Practice of Medicine.
2. Nelson, Loose Leaf Medicine, Vol. III, pp. 356-362.

A NEEDLE FOR ANESTHESIA OF THE MAXILLARY NERVE

By J. CONNOLLY, Lieutenant (Junior Grade), Dental Corps, United States Navy

The need for a remote injection to produce anesthesia for the extraction of badly abscessed upper bicuspid teeth led to an effort to find an easy, accurate way to produce anesthesia of the maxillary division of the trigeminal nerve. After making 53 injections with a needle he has devised the writer feels that he can produce anesthesia in the second division of the trigeminal nerve as safely, as accurately, and as easily as he can in the third division.

The most accessible part of the maxillary nerve is in the sphenomaxillary fossa, and the shape of the posterior surface of the maxilla is such that it can be followed by a curved needle.

After measuring several skulls, a 20-gauge Becton-Dickinson nickeloid needle, $1\frac{5}{8}$ inches long, was bent along the circumference of a circle with a radius of $1\frac{5}{8}$ inches. The needle was bent so that the bevel faced the center of the circle and so that the plane of the circle formed right angles with the flat faces on the hub of the needle. This direction of the bevel sends the solution toward the sphenomaxillary fissure, while the plane in which the needle is curved allows one flat face on the hub to be used as a guide in directing the needle through the tissue.

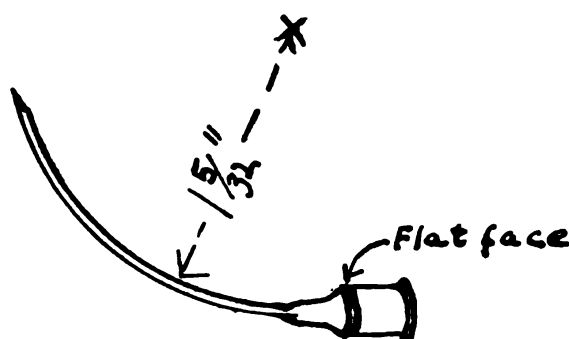
Four cubic centimeters of a 2 per cent solution of novocaine seems to be the correct dosage and concentration. If a 2-cubic centimeter syringe be used, this allows two injections.

The needle is placed on the syringe so that the flat faces on the hub are parallel to the axis of the handle.

Before inserting the needle the area over and above the molar roots is palpated and the posterior surface of the malar process is located. The syringe is held with the barrel horizontal and the needle pointing upward. Any loose, soft tissue lying against the tuberosity is pushed back and the needle is inserted through the mucous membrane just back of the malar process, usually over the apex of the next to the last molar tooth present. A drop or two of solution may be injected at this point if needed. The needle is then pushed inward, upward, and forward, following an arc of a circle of the size to which the needle was bent, keeping as close to the bone as possible. The needle should be inserted along a curve that lies in a plane which makes an angle of about 35° with the sagittal plane, and as the needle progresses inward the barrel of the syringe should be moved downward from the horizontal position until it makes an angle of about 40° with the long axis of a normally placed upper

first molar. If resistance be encountered, the needle should be slightly retracted and pushed in different directions until one is found in which it passes freely.

When all of the needle but three-eighths to one-quarter of an inch has been inserted an attempt is made to inject the solution. If resistance or pressure be felt, the needle is slightly retracted and pushed a



THE NEEDLE

FIG. 1.

little farther forward or to one side until a place where the solution flows in freely is found. Usually no resistance is offered to the free passage of the needle nor to the free flow of the solution, but when resistance occurs it may mean that a blood vessel has been encountered. As a further precaution against injecting into a vessel, the needle is worked slightly back and forth as the injection is made.

When the first injection has been completed the needle is quickly withdrawn and a second injection is made. This time the needle is held as before and inserted at the same point but instead of being directed inward at a 35° angle the needle should be directed upward and forward following an arc located in a plane parallel to the sagittal plane. As before, the needle should be kept as close to the bone as possible as it passes toward the sphenomaxillary fissure and the injection should be made when the needle has been inserted to a distance of about $1\frac{1}{4}$ inches.

Occasionally, as the needle reaches the correct place for the injection the patient will be a little startled. This is a paresthesia caused by contact with the nerve. It is over immediately, causes no discomfort to the patient, and lets the operator know he has found what he was seeking. This gives the patient confidence.

The waiting period is usually about 10 minutes.

Symptoms of anesthesia which occur shortly after injection are numbness of the skin in the infraorbital region, a feeling of numbness inside the nose, and numbness of the mucous membrane over the hard palate. The mucous membrane over the external plate of

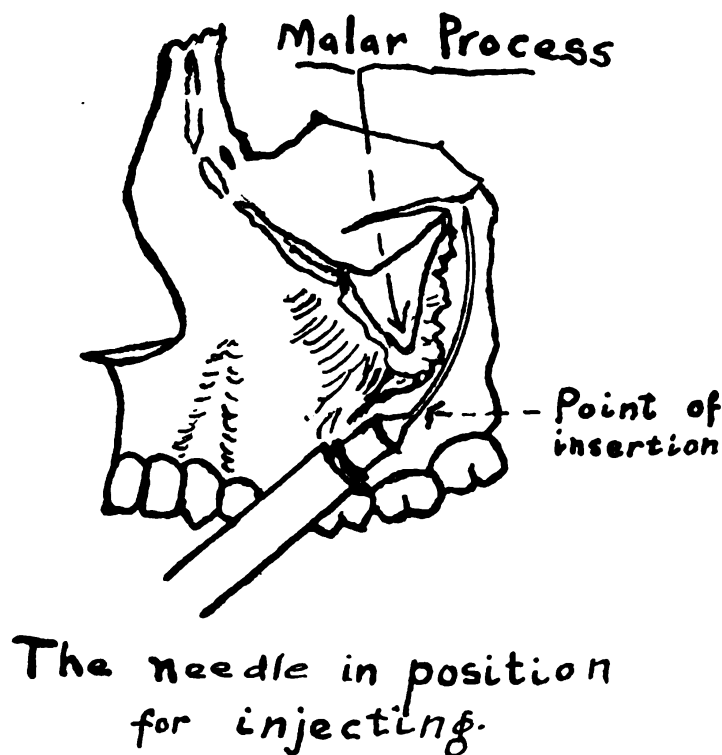


FIG. 2.

the alveolar process is usually the last tissue affected and when it is numb the operation may be commenced.

The purpose of this paper is not to discuss fully the sphenomaxillary injection, but to describe a needle, a route of injection, and a dosage which will increase the percentage of successful attempts to anesthetize the maxillary nerve. In 53 cases there occurred one failure to anesthetize, one wheal in the infraorbital region, and one apparent swelling of the parotid gland. The failure occurred in the fourth case, before the dosage and the correct positions for the injections had been determined. The wheal went down after a few hours, and the swelling of the parotid was reduced by massage during the waiting period.

The writer would like to have others try this needle, dosage, and technique, because he feels that they make the sphenomaxillary injection safe, easy, and accurate.

POISONING FROM SOAP VINE

REPORT OF CASE

By G. F. COOPER, Lieutenant (Junior Grade), Medical Corps, United States Navy

There are several varieties of soap vine in Haiti, none of which have heretofore been known to be poisonous to man, but all of them more or less inhibitive for plants, presumably by overgrowing them.

The variety mentioned in this article is not supposed to be toxic for human beings, according to well informed natives of Haiti. However, in view of the fact that it can be toxic, and may cause all of the manifestations of foreign protein sensitization, it was thought that a report of a case would be sufficiently interesting to publish.

The type studied in this case is known locally as soap vine, and to agricultural experts as *Urveilla*, of the family *Sapondacea*. It is a free-growing vine, climbing over hedges and smaller shrubs, and even the sides of houses as high as the second story. It blooms in Haiti in November and December, in the form of small yellow flowers, with abundant small buds, all of the latter being filled to bursting with a yellow-colored pollen, which is freely shaken out of the plants, and which is light enough in weight to be wind blown for some considerable distance from the vine.

This variety of soap vine has been known to kill off hardy types of hedge, either by inhibiting their growth through overgrowth, or by some toxic influence.

CASE REPORTS

Female, age about 35, has been in Haiti for two years, and had one previous attack about one year ago. She does not appear to be of a neurotic temperament. On the first evening of the attack, she returned from a dinner feeling well. At about 3 a. m. she awoke, complaining a swelling and itching of the face and eyes, and constriction in the throat, with a sense of choking. This continued through the night, and at 8 a. m. the following morning the writer saw her. Her appearance was typical of urticaria with intense swelling and redness of the face and eyelids, and swelling of the lips. The upper eyelids were extremely swollen, and most striking was a white discoloration just below the lower lids. The conjunctiva of both eyes was congested and hyperemic. There were typical large hives on the soles of the feet and on the forearms. The throat was swollen, and edema of the glottis necessitated prompt administration of adrenalin. The effect of the drug was immediate, the pulse increasing, in about three minutes, from 60 to 108 beats per minute, and the patient soon felt better.

Not knowing the cause of the attack at this time, she was questioned as to food and previous attacks, and given a careful examination. She remembered an attack one year previously, which was not so severe, and this suggestion of seasonal occurrence resembled plant or pollen sensitization. In looking about the yard, the soap vine was seen to be the only plant pollenating, and since the prevailing wind tended to blow the pollen into the bedroom, it was thought that the pollen lodged in the mosquito net, and was shaken onto the bed and into the face of the sleeper when the net was lowered for the night.

After thorough elimination with castor oil and saline purges, and in spite of adherence to rigid diet the attacks continued, so the patient was moved into another part of the house, and immediately began to recover. In fact, after suffering intense itching for several days, the symptoms subsided in two days after changing sleeping quarters. The patient has had several attacks of hay fever, which she believes are caused by the logwood plant, *Haematoxylon campechianum*, and the soap vine was found to be growing in profusion over the logwood.

SYMPTOMS IN DETAIL

Face.—Swollen and congested, with intense itching.

Eyes.—Red, lids swollen, conjunctive congested and hyperemic, with swelling and white discoloration under the lower lids.

Throat.—Edema of the glottis of a severe type. Lips extremely swollen and resembled a typical case of angioneurotic edema.

Skin.—Numerous hives over the body, especially prominent on the forearms, soles of feet, and over the pectoral muscles.

Heart.—Slow, rate 60; pulse weak; complained of feeling of beginning unconsciousness; was extremely apprehensive.

Abdomen.—Negative, except for history of constipation and some abdominal cramps on day of attack.

Nervous system.—Extremely nervous, tremors of hands and fingers, reflexes unaffected.

Kidneys.—Congested, did not void an appreciable amount for 48 hours, although intake of fluids was several hundred cubic centimeters. Urinalysis showed many red blood cells, few white cells, negative albumin and sugar. No casts.

An extract of the pollen of the soap vine was prepared by collecting the pollen, macerating in alcohol, extracting with ether, and drying. The dried powder was suspended in normal saline and 0.3 per cent tricresol added as preservative. This extract gave a positive skin reaction in a dilution of 1:500, in about 15 minutes, while the control of tricresol in salt solution was negative. The reaction was very striking when the extract was applied to a scratch on the forearm, and consisted of a raised area of redness along the scratch, with pseudopod formation above and below the scratch, with intense itching.

THE DIRECT DIAGNOSIS OF PERICARDITIS WITH EFFUSION¹

By C. G. DYKE, Lieutenant (Junior Grade), Medical Corps, United States Navy

The subject of pericarditis with effusion has been selected by the writer because of the difficulty encountered in making the diagnosis of this condition. Locke in reviewing 3,683 autopsies, found 17 cases with pericardial effusion of over 200 cubic centimeters none of which had been diagnosed clinically. In order that the percentage of undiagnosed cases of pericarditis with effusion may be decreased, it might be well to review the points upon which the diagnosis is made.

History.—Certain conditions seem to predispose the individual to pericarditis with effusion. Adults, and especially those past middle age, seem to be most susceptible. Certain acute diseases, as rheumatic fever, tuberculosis, pneumonia, and septicemia predispose the individual to the condition. Diabetes and Bright's disease are outstanding. Frequently the effusion follows a plastic pericarditis.

Symptoms.—The symptoms are variable, depending on the rapidity with which the effusion takes place, the extent of the effusion and the etiological factor. The onset may be insidious, as in tuberculous cases; while it is often rapid in rheumatic cases, where myocardial changes are apt to occur. The pain may be sharp and stabbing, or merely consist of a feeling of oppression and suffocation. Pressure over the sternum may accentuate the pain. Usually as the amount of fluid increases the pain will decrease. Dyspnea is an important symptom. The patient is often found lying on his left side or occupying the erect position. An anxious dusky countenance is often noted. Cyanosis is not uncommon. The pulse is usually rapid and small; irregularity occurs at times. Pulsus paradoxus is not infrequently seen. Dysphagia may be marked. Distention of the veins of the neck and extremities is frequently noted. Aphonia occurs in some cases, due to compression or irritation of the recurrent laryngeal nerve. Certain nervous manifestations are sometimes seen, as restlessness, insomnia, chorea, and melancholia. Toward the close, low delirium and coma often develop.

Physical findings.—Inspection.—The patient usually lies on his left side or sits erect. Cyanosis and pallor of the face occur. Rapid breathing is an outstanding symptom in some cases. Prominence of the veins of the neck and extremities is common. The cardiac impulse is wavy or may be entirely absent. In children, bulging of the inter-spaces is often seen and there may be edema of the chest wall. There is diminished expansion of the left chest. At times a distinct prominence is found in the epigastrium due to a pushing down of the diaphragm and liver.

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Palpation.—Gradual diminution and finally obliteration of the cardiac impulse is a striking feature in progressive effusion. The impulse may persist in the third or fourth left interspaces. A pericardial friction rub may be present, and continue even with an increasing effusion. The pulse is usually rapid and feeble, the volume diminishing during inspiration and increasing during expiration. Occasionally extra systoles or partial heart block develop.

Precussion.—There is an increased area of cardiac dullness, somewhat triangular in shape, with its base below. This area of dullness changes with the position of the patient, being wider at the base when he is recumbent. The area of dullness may extend to the first or second interspaces on the left. Dullness is often present in the fourth and fifth right interspaces. (Rotch's sign.) At the angle of the left scapula an area of dullness, with bronchial breathing and bronchophony is found in many cases. The cardio-hepatic angle is found to be obtuse. (Ebstein.) Flatness over the fifth and sixth dorsal vertebrae has been noted. An important finding is the discrepancy between the point of maximum impulse and the left border of cardiac dullness.

Auscultation.—A friction sound is heard early which tends to disappear as the effusion increases, but it may persist, especially over the base of the heart. With the absorption of the fluid the rub may reappear. Gradual weakening or absence of the heart sounds is important. The cardiac action is often increased and the pulmonic second is accentuated. Tubular breathing is sometimes elicited in the left axillary region in large effusions, and is common at the angle of the left scapula. (Ewart's sign.) The systolic blood pressure remains stationary or decreases, while the diastolic pressure rises with the accumulation of fluid.

X-ray findings.—Vaquez and Bordet state that the X-ray findings are—

1. A globular increase in the heart's shadow.
2. An increase in the transverse diameter above that of the long oblique diameter, together with bulging of the left upper border and shortening of the pedicle formed by the great vessels.
3. Diminution or absence of visible cardiac movements.

Holmes sums up the X-ray findings as follows:

1. An abnormally shaped heart shadow which changes its form with a change in position of the patient.
2. Obliteration of the normal heart outline especially at the junction of auricles and ventricles.
3. Changes in the shape of the area made by the posterior border of the heart, the diaphragm, and spine.
4. Faint or absent pulsation.

CONCLUSIONS

1. Pericarditis with effusion is difficult to diagnose and is frequently not diagnosed.
2. To make the diagnosis the physician must be looking for it and follow his patient from day to day.
3. X ray is the most reliable method of making diagnosis.

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3. Nelson's Loose Leaf Living Medicine (Article by Samuel A. Levine).
4. McCrae: Osler's Principles and Practise of Medicine.

WHAT SHOULD THE DIAGNOSIS BE?

By C. A. ANDRUS, Lieutenant Commander, Medical Corps, United States Navy

J. A. B., aged 21, was recruited in Big Timber, Mont. Leaving his home March 3, 1927, he reported at the recruit depot, Marine Corps base, San Diego, Calif., March 7, 1927. He was accepted for the service and became a private in the United States Marine Corps March 9, 1927. So far as he knows he did not come in contact with any sick person while en route from Big Timber to San Diego.

On March 12, 1927, he received routine cow-pox vaccination. No history of previous protection against smallpox was elicited, nor was a scar found.

Beginning March 15, 1927, he did not feel very well, but did not think it necessary to report in as being sick until the 17th. At this time he complained of severe headache, general malaise, and fever. His temperature was 103.6° F., pulse 100, and respiration 22. Examination revealed a well-built and well-nourished young man with flushed facies, injected conjunctivæ, and slight redness of fauces. Heart, chest, and abdomen were negative. There was a moderate reaction at the site of vaccination, but the skin was otherwise clear. White blood count, 6,000.

In view of the clinical picture and relative leucopenia a diagnosis of influenza was made. Among a large number of admissions for catarrhal fever, acute, influenza has been diagnosed in but two cases this winter. He was put to bed and given elimination and routine treatment.

The temperature at 8 a. m., March 18, was 101° F., and at 4 p. m. of the same day his temperature, pulse, and respiration were normal. All symptoms were markedly improved and continued to subside with a prompt return to normal. The patient was restored to duty March 21 without any complaint and feeling well.

On the 23d he came to the sick bay to report a rash which had the same day appeared on the face and body. His temperature, pulse, and respiration were normal and there were no subjective symptoms. He was admitted for isolation and observation. Examination at this time revealed an increase in the degree of reaction at the site of vaccination, there being a large indurated and reddened area about a center of pustular formation. The rash present was a scattered vesicular eruption. The vesicles were well elevated above the surrounding normal skin and were filled with a sero-purulent material.

A narrow, red margin marked the base of each vesicle and in a few isolated lesions there was a suggestion of umbilication. The distribution was most

marked over the face and body with a number on the extremities but none on the palms of the hands or soles of the feet.

A wet boric acid protective dressing was applied to the site of vaccination and no other medication was given.

During the first 24 hours after admission there was a slight increase in the number of lesions and three or four red points appeared on the palms and soles, but these did not have a "shotlike" feel. There was no appearance of lesions in crops. By the 29th the rash had disappeared and the lesions had dried up, leaving no scars. He felt well throughout the course of the eruption.

The patient received a letter from Big Timber dated March 24, 1927, telling of several cases of smallpox which had developed in the home town shortly after his departure. Four of the cases were among his former associates, and one of these was the girl author of the letter who "came down with smallpox" March 4th, the day after the patient left home.

Was the case of J. A. B. one of varicella; one of variola, modified by vaccination received during the period of incubation; or was it a case of vaccinia with generalized eruption? Should the four sick days charged to influenza be considered as due to whatever disease condition may finally be diagnosed?

MULTIPLE SCROTAL FISTULÆ FOLLOWING RUPTURE OF THE BLADDER WITH STRICTURE OF URETHRA—OPERATION AND RESTORATION OF FUNCTION

REPORT OF CASE

By L. H. WILLIAMS, Lieutenant Commander, Medical Corps, United States Navy

A man, 48 years of age, presented himself at the Justinien Hospital, Cape Haitien, Haiti, for operation for cure of multiple fistulæ of the scrotum and stricture of the urethra. He gave a history of a severe illness of some two months duration, from which he was now almost recovered. His illness began with a difficulty of urination of long standing, becoming acute to the point of complete urinary retention. Extravasation of urine had occurred before surgical aid could be given him and fistulæ formed in the scrotum with release of urine. Infection supervened, but was controlled by intravenous injections of mercurochrome and milk, urotropin, and increased fluid intake. When examined at the hospital he was somewhat emaciated and weak as result of his old infection. There were four fistulæ in the scrotum. The stricture of the urethra was too dense to allow introduction of any instruments. Filiforms could not be passed. Each of the scrotal fistulæ was surrounded by dense fibrous tissue masses, some attaining the size of a man's thumb. There was partial control of urine, though some leaked through the several fistulæ.

Operation under ether disclosed unusual and interesting pathology. Each fistula was surrounded by a mass of scar tissue which harbored

a collection of pus. These fistulæ did not connect with the urethra at any part of its extent. They connected, however, with a fistula which led up to and over the right pubic bone to the prevesical space. A small sound was forced through the penile urethra to the perineal urethra. It could not be made to go further without undue trauma. The perineal urethra was visible as the result of excision of the fistulæ. It was incised. Neither sound nor filiform could be made to enter the bladder through the prostatic urethra. Palpation with the finger revealed a very tough stricture of the prostatic urethra. The bladder was opened by the suprapubic route. It was found to be pathological. The walls were thin and friable, the veins congested. No opening could be seen in the region of the trigone nor could any be palpated. A sound could not be passed into the prostatic urethra, which was apparently completely strictured. A discolored fenestrated area was found in the bladder wall in the region of the right pubic bone. The bladder was attached here by adhesions. This was taken to be the area where rupture occurred and through which urine had continued to escape into the scrotum. In order to reestablish the prostatic urethra it was necessary to force a sound through the organized scar tissue that was once that organ. This was done and the sound was cut down upon where the tip could be palpated in the only palpable depression of the trigone area of the bladder. A 20-gauge rubber catheter was inserted throughout the length of the urethra into the bladder and secured by silk worm to the glans penis. The incised urethra was sutured. The incision in the bladder was sutured without bladder drainage. A drain was left in the prevesical space. The patient was given three injections of mercurochrome and glucose, with intramuscular injections of milk afterwards at 24-hour intervals to combat the infection which supervened. The drain in the prevesical space was removed at the end of a week; the catheter was removed after two weeks. Normal function was present in three weeks.

The case is interesting because of the recovery after rupture of the bladder extraperitoneally without benefit of surgical interference, and the restoration of function after complete stricture of the prostatic urethra had been rectified by operative means.

TRAUMATIC RUPTURE OF THE SPLEEN

REPORT OF CASE

By F. X. KOLTES, Commander, Medical Corps, United States Navy

F. W., SC1c., was admitted to the hospital July 23, 1926, with a history of having been in an automobile wreck several hours before. In an attempt to turn a corner the vehicle ran over the curb and against a building, the patient

being thrown out. He was a large man, weighing about 200 pounds. He admitted having drunk much liquor, and its effects were still manifest upon his arrival at the hospital.

Examination upon admission revealed contusions upon the left frontal region and on the chest at the base of the left axilla. The patient did not seem to be severely injured, there being no shock nor signs of hemorrhage. He did not complain of pain during the first day, which may be explained by the alcoholism. The patient was kept at rest and under observation and was instructed not to leave his bed for any reason.

The second day after admission he began to complain of sharp pain of his left side in the region defined by the contusions mentioned above. They were not intensified by deep breathing nor were they relieved by immobilization of the chest. They persisted, in fact, during the next two days, excepting as relieved from time to time by narcotics.

Four days after admission the patient got out of bed, unseen by the nurse, for the purpose of visiting the toilet. While there he slipped upon the tile deck and fell with considerable violence.

Immediately he began to have pain in the splenic region and in the abdomen. This was soon accompanied by great pallor and a thready pulse. Upon arrival of the surgeon a short time later the patient appeared to be in a state of collapse. The pulse was 130, weak and thready. The systolic pressure was 65 mm. Hg. There was percussion dullness in the left flank. Blood examination showed a red cell count of 4,100,000. The hemoglobin was 80 per cent. The signs and symptoms plainly pointed to abdominal hemorrhage, probably from splenic injury. It seemed but natural to infer that if the spleen was injured there had been hemorrhage going on, confined within the capsule, and that its gradual augmentation had been stripping the capsule more and more, which accounted for the sharp pains. The additional violence of the fall in the toilet had finally rent the capsule, in consequence of which profuse secondary hemorrhage into the peritoneal cavity had taken place.

In view of the patient's desperate condition, as indicated by the low blood pressure, operation was delayed, hoping that bleeding might stop for a time at least and that stimulating treatment might bring on a reaction in his general condition more favorable for the success of surgical treatment. These hopes were realized in eight hours when the blood pressure had risen to 105 and the pulse volume had greatly improved.

Operation, July 27, 1928. After a transfusion of 500 c. c. of citrated blood, the patient was etherized. A left paramedian incision extending from the costal margin to below the umbilicus was made.

The rectus abdominis was transposed outward. The abdomen contained a large amount of free blood and clots, the latter confined mostly to the upper left quadrant. The clots were removed. The spleen was delivered into the wound and removed. It was found to be rent across the middle; and the capsule, torn in line with the rent of the organ, was undermined and raised from the surface by blood clots an inch or more in thickness. The wound was then closed without drainage, the operation requiring 40 minutes, difficulty being encountered in suturing an unrelaxed and thick abdominal wall.

The patient made a good recovery. There was some breaking down of the wall at the lower angle. Convalescence was also somewhat disturbed by severe pain in the tibias—mostly the right. The anemia has been quite persistent. Seven months after operation the red cells numbered 4,300,000 and the hemoglobin was 85 per cent. Color index, 0.9; leucocytes, 5,600, with the differential count above normal. The patient feels perfectly well.

A quite large number of cases of traumatic rupture of the spleen with operation have been reported in recent years. The mortality in the operated cases is about 35 per cent at the present time. If this case deserves any special comment, it would be with respect to the unusually clear demonstration of the course of events which started as a subcapsular hemorrhage and ended as a profuse secondary hemorrhage with grave symptoms. It is difficult to believe that the fall on deck was of any importance, since a spleen so badly injured as this one was would certainly have had a secondary hemorrhage sooner or later.

From the reports of the many cases now on record it is noted that severe hemorrhage sometimes does not occur until two to four days after an accident in which the spleen is ruptured. One is therefore led to speculate upon the advisability of early operation in these cases; that is to say, during the prehemorrhagic stage. The problem, of course, is to know whether the spleen is severely injured. It would be very desirable to establish the diagnosis based upon symptoms which come before severe hemorrhage has taken place in cases where it is delayed. If this were possible, then quite a number of operations for rupture of the spleen might be performed with comparative safety instead of under the desperate circumstances which usually prevail.

It is a well-known fact that splenic blood, being rich in leucocytes, coagulates quicker than blood from other organs. The surgeon is therefore justified in pursuing an expectant plan of treatment in selected cases of splenic hemorrhage, as was done in this case. In any other kind of intraabdominal hemorrhage immediate operation is mandatory, since spontaneous cessation of hemorrhage is not to be looked for, and delay only serves to diminish the chances which operative aid may have to offer.

APPENDIX ABSCESS VERSUS PYONEPHROSIS

By G. F. COTTLE, Commander, Medical Corps, United States Navy

The two cases reported below illustrate the difficulties sometimes met with in differentiating appendicitis and pyonephrosis, and show the advisability of early operation in obscure cases, sometimes even before it is possible to carry out all the desirable laboratory and other special tests commonly employed as aids to diagnosis.

CASE 1

Appendix abscess.—W. C. P., seaman, second class, United States Navy, case 9042; 20 years old, white, male, was admitted to the U. S. S. *Relief* while under way at sea with the fleet, February 9, 1926, diagnosed *appendicitis*, acute. Upon admission it was evident that the young man was quite ill. He

was pale, temperature was 102, and pulse 104. He had a cough and there was impaired resonance over the right lower lobe posteriorly. Examination of the abdomen showed a mass in the right abdomen in the region of the appendix. This mass was very tender and there was definite tenderness in the costovertebral angle and right loin. The abdomen was moderately distended and the spleen sufficiently enlarged to be easily palpated 1 inch below the costal margin. Leucocytes, 19,600; polys, 84 per cent. Urine contained albumen X 1, a few hyaline casts, and 3 or 4 leucocytes to the field in the centrifuged sediment. The patient had been in bed on board his ship for 10 days. At the beginning he had been taken with a severe cold and his symptoms when first admitted to the sick bay were like those of several other cases of influenza, at that time epidemic on board his ship. He did not get well so quickly as the other cases of "flu," and accompanying his enlarged spleen he had an intermittent fever. These findings, together with a history of having had malaria in Texas in 1920, led his medical officer to give him quinine. All these symptoms and findings apparently masked the early signs of an acute appendicitis. The health record showed that the mass in the appendix region appeared only the day before he was sent to the hospital ship. The surgical staff of the U. S. S. *Relief* were in agreement with the patient's own medical officer that this young man had acute appendicitis and was in need of operation. The finding of definite tenderness in the costovertebral angle, however, brought into the anteoperative diagnosis the possibility that a perinephritic abscess might be present. Operation disclosed a normal peritoneum, but the appendix was not seen, although it was easy to see the junction of the ileum and cecum and the ascending colon.

The cecum and colon lay pushed forward by a large tense mass. After walling off the peritoneal cavity the lower end of the cecum was elevated and, when the parietal peritoneum was broken through at that point, a large abscess containing pus with a colon odor was evacuated. This abscess lay between the cecum and ascending colon and the kidney. As the appendix was not seen, it is believed that this abscess, though contiguous with the kidney on its anterior surface, was a retrocecal appendix abscess and not a perinephritic abscess. Its location in contact with the kidney, however, explained the presence of the symptom elicited; i. e., tenderness in the costovertebral angle. The patient recovered nicely and has returned to duty with the advice that removal of the appendix be considered at a later date when adhesions have had time to resolve.

CASE 2

Pyonephrosis.—L. G. E., fireman, third class, United States Navy; case 9552; 19 years old, white, male, was admitted to the U. S. S. *Relief* while under way with the fleet, March 22, 1926, diagnosis undetermined. Upon admission he was pale and looked quite sick, temperature 102, pulse 94. Examination of the abdomen showed a large mass in the right hypochondrium, extending down to the crest of the ilium and merging above into the tensely held muscles of the right hypochondrium. The mass was very tender and there was marked tenderness in the right costovertebral angle and right loin. The abdomen was moderately distended. Leucocytes, 14,300; polys, 73 per cent. Urine contained albumen XX 2, granular casts, and 10 to 15 leucocytes to the field in the centrifuged specimen. The patient had been sick aboard his ship for about two weeks. At the onset the pain in the right side was severe, awakening him from his sleep, and he had vomited. At the beginning of his illness he had marked frequency of urination, but later this frequency had ceased. He stated that he had had some fever each day.

The health record showed that a year ago he had been treated in the United States naval hospital, Norfolk, Va., for pain in the right side, at which time a diagnosis of "Undetermined (Renal Calculus?)" was made. As X ray did not confirm the suspicion of calculus, the diagnosis was changed to "Strain, serratus magnus muscle, right." The surgical staff of the U. S. S. *Relief* felt that the mass was due to pus, either an appendix abscess or a pyonephrosis, but acute appendix was believed to be the most likely of the two. Operation disclosed a normal peritoneum and a normal appendix. The appendix was removed and the very large mass explored. It was found to occupy the right loin and to have, in general, the shape of a kidney though about three times the kidney's normal size. Its large size led the surgeons to feel that the tumor might be a hypernephroma or a large hydronephrotic kidney. The left kidney seemed, by palpation, to be normal. As no test of function of either kidney had been made and as the temperature and leucocytes indicated the possibility of the presence of pus, removal of the kidney tumor at that time through the intraabdominal incision was decided against. The day following this exploration and appendectomy, the patient's pain was practically gone and his fever came down almost to normal. Careful inquiry again made elicited no history of hematuria, though there was a history of loss of 20 pounds in weight. On the morning of the day following operation the urine was clear, but in the afternoon it was almost pure pus. (Fig. 1.) This finding established the diagnosis, infected hydronephrosis or pyonephrosis. April 16, 1926, the right kidney was removed and the patient is now convalescent. Pain has ceased and he is gaining weight. (Figs. 2 and 3.)

DISCUSSION

Even when an experienced urologist is available, surgical explorations of the abdomen may occasionally be necessary in cases suggestive of kidney pathology before urological examinations may with safety to the patient be permitted. There are cases in which the vital issue must first be met. An acute appendix in need of operation should not be allowed to wait without operation until urological examinations can be made even if the kidney is under suspicion. At the first examination both of these patients seemed to have appendix abscesses, both were acutely ill, with a mass in the right iliac fossa, fever, elevation of pulse, and leucocytosis. In addition both had albumen in the urine and both had that symptom so often indicative of surgical disease of the kidney, costovertebral tenderness. Case 1 was cured by drainage of an abscess through the peritoneum in the appendix region. Case 2 was not cured by the appendectomy but was cured by right nephrectomy. In case 2, a history of symptoms suggestive of kidney pathology a year prior to this attack, a history of intermittent frequency of urination, and a finding of 10 to 15 leucocytes to the field in the urinary sediment, called attention to the kidney as a possible source of the trouble. The finding of a large tumor in the kidney region at operation and the appearance of intermittent pyuria after operation sharpened the picture of surgical disease of the kidney. The urologist's determination of

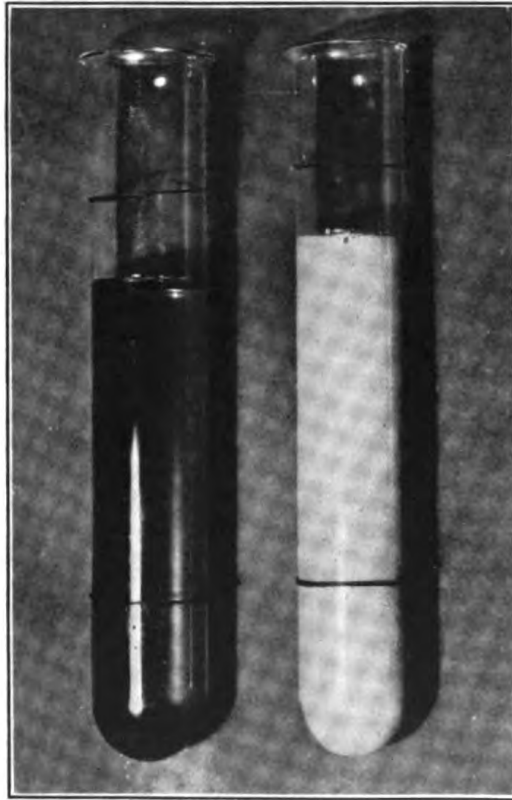


FIG. 1.—INTERMITTENT PYURIA; PYONEPHROSIS

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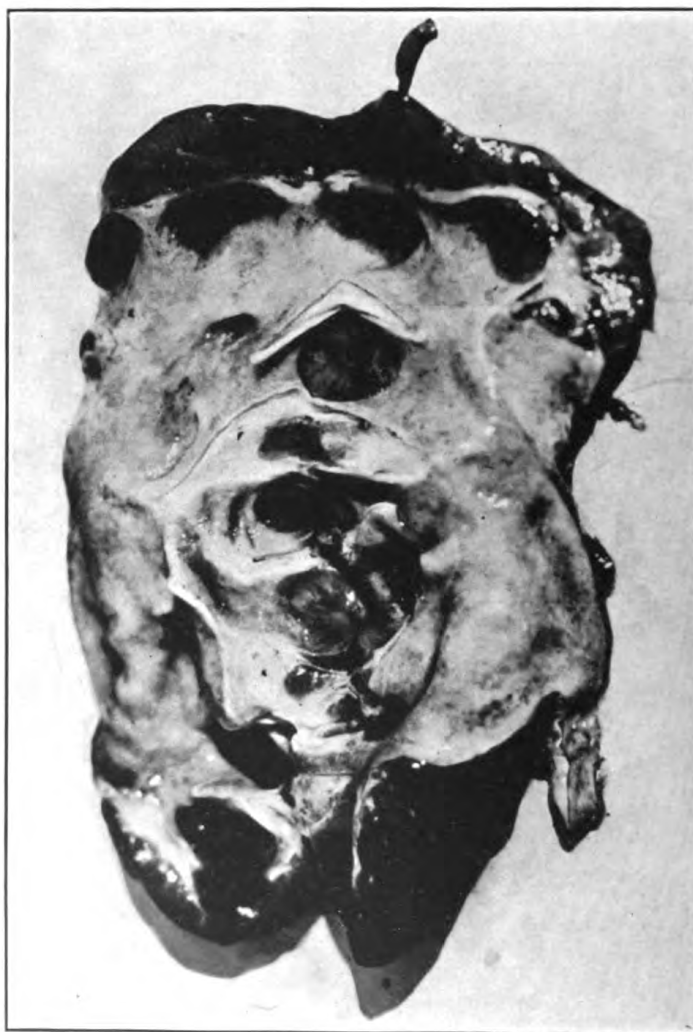
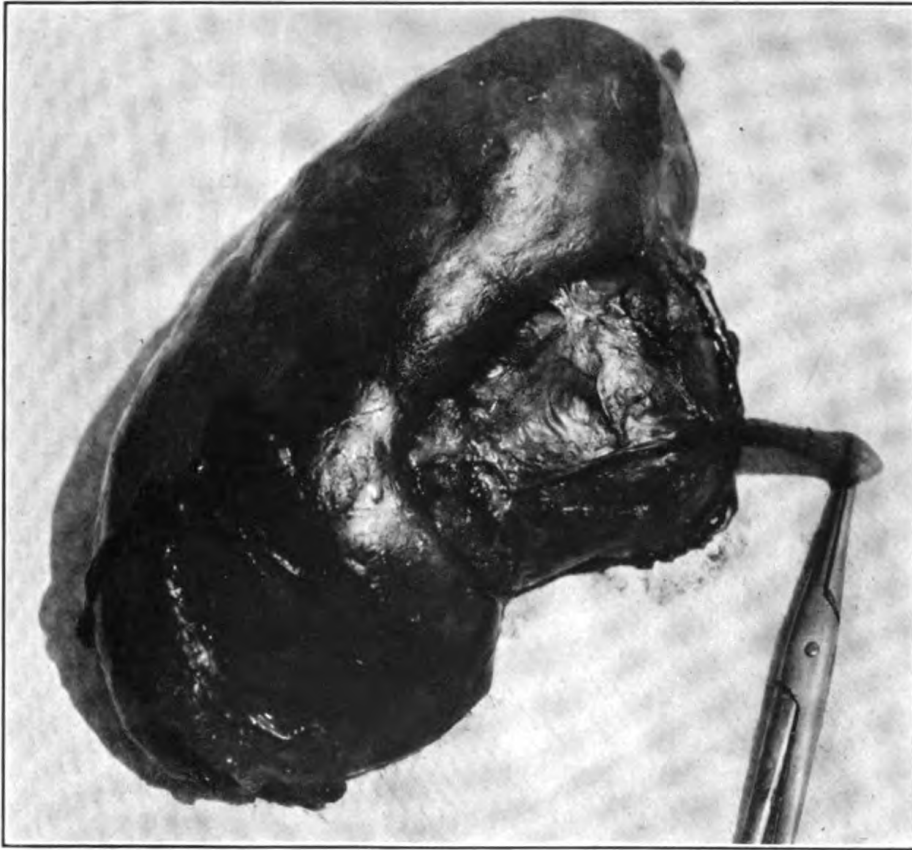


FIG. 2.—PYONEPHROTIC KIDNEY SHOWING DILATED PELVIS
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902—3

FIG. 3.—PYONEPHROTIC KIDNEY

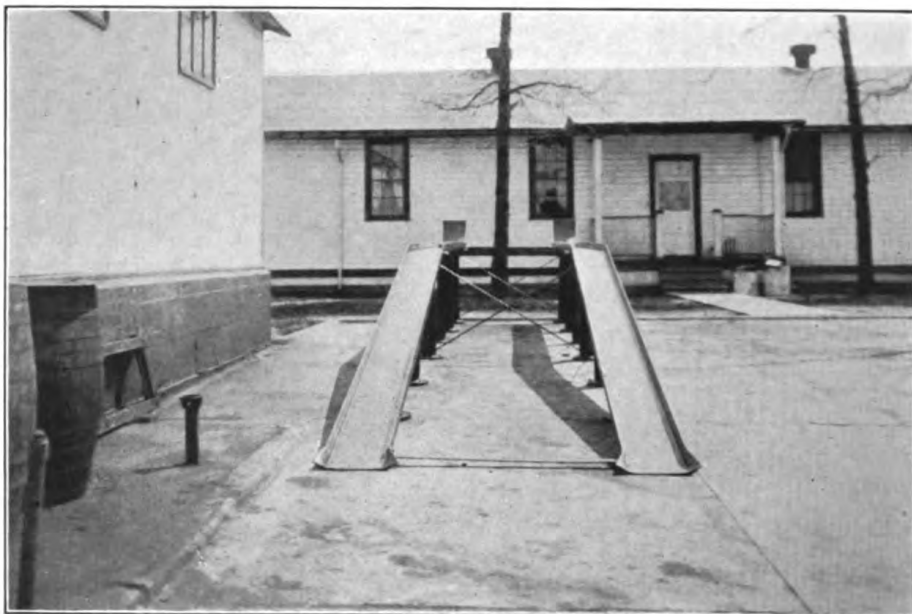


FIG. 1

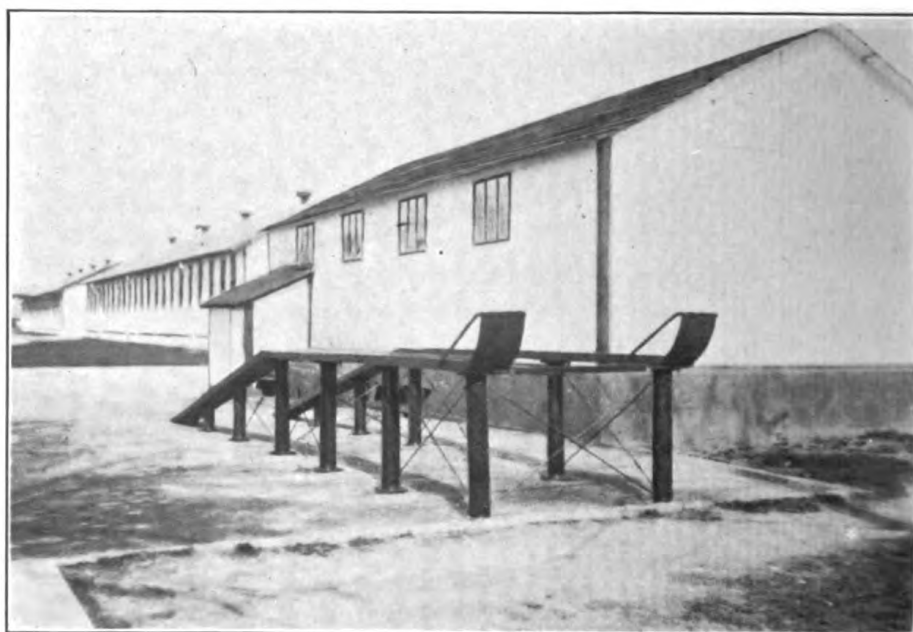


FIG. 2

GREASE RACK FOR AUTOMOBILES. (FARENHOLT)

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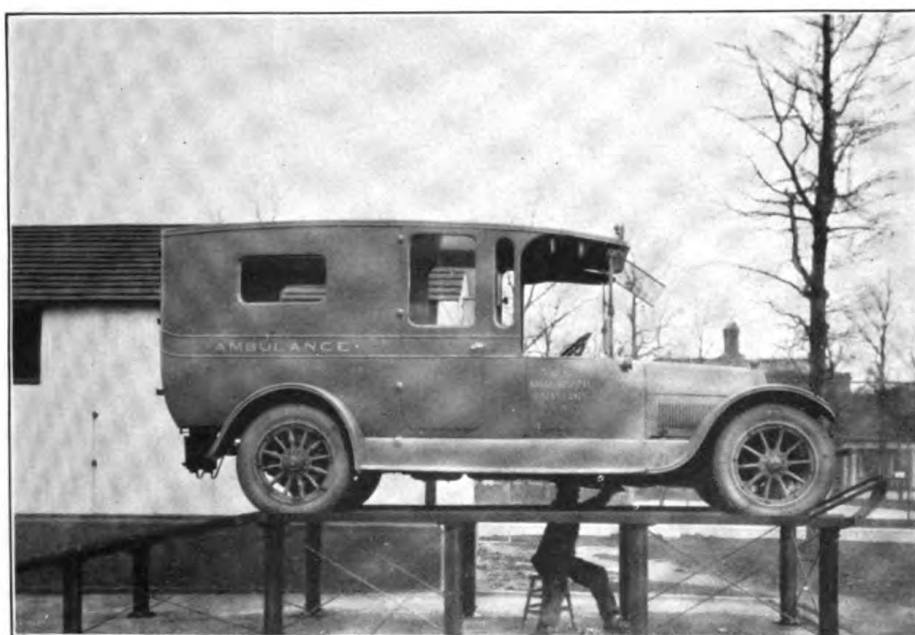


FIG. 3.—GREASE RACK FOR AUTOMOBILES. (FARENHOLT)

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kidney function by ureteral catheterization made the decision in favor of nephrectomy a safe and sound procedure.

MERCUROCHROME IN A CASE WITHOUT DIAGNOSIS

By B. W. HARRIS, Lieutenant (Junior Grade), Medical Corps, United States Navy

Since the advent of the dyes in the treatment of disease much has been written about them, and particularly about the use of mercurochrome.

After reading an article by Dr. Burr Ferguson on the use of mercury salicylate, the writer was led to make a study of the subject and work out a logical reason for the seemingly good results that were being obtained from the use of mercurial preparations. In his article Ferguson mentioned the rise of fever with a corresponding rise in the white blood count, and the correlation between the severity of the reaction and the increase in white cells. This seemed to be in keeping with one of the first principles in the study of pathology, namely that "the leucocytes in the blood rush to the site of injury to wall off infection," or, to put it in simple terms, the white cells as one army and the invading organisms as the other, meet at the site of injury, and it depends upon which is in greater number as to the outcome. This of course is a very elementary way to put it, yet that is the way things take place.

All of us, at some time or other, probably have heard one of our elders in the medical profession say that he always gave his patients massive doses of calomel when he was called to see them. It rarely made any difference as to what the diagnosis was, and very often the diagnosis was not made, yet 90 per cent of the patients got well. The use of the microscope had not become universal at that time, and consequently we have no knowledge of the blood reaction in cases so treated, but it is safe to guess that the leucocyte count was increased, and with it the fever, temporarily. However, with the decrease in the extent of infection, as the invading bacteria were killed off, the fever dropped, or, to put it slightly differently, as the patient's resistance was built up he got less and less reaction from subsequent doses. We now know this to be the case when mercury is used intravenously, from taking blood counts both before and after each injection.

This is well illustrated by the case reported, which is of additional interest because it occurred on board a destroyer during a recent cruise in the Mediterranean. It is to be regretted that, owing to lack of laboratory facilities a complete study of this case could not be made. No definite diagnosis was established, even though the

patient was on two occasions admitted to a hospital—first, the French hospital at Ferryville, Tunisia, in northern Africa, and next, an Italian military hospital in Trieste, Italy. Both of these hospitals submitted reports of findings and treatment, given, of course, in the native language of the respective country, but, when translated, very little information had been gained. Therefore no claim can be made here for the cure of any definitely known disease.

CASE REPORT

J. W. P., U. S. S. *Lamson* (328), Bizerta, Tunisia, Africa, February 22, 1926.

Past history was of no particular interest other than that on the 11th of February the patient had been admitted, and discharged under treatment, with the diagnosis of gonococcus infection of urethra. At the time of the present admission he was practically free from any urethral discharge. He had received the routine treatment for gonorrhea.

Present history.—About 4 a. m. February 22, 1926, patient was seized with severe pains in lower right quadrant of the abdomen, with a desire to vomit, pain becoming more and more intense as time went on. He was seen by the chief pharmacist's mate on his ship, who gave him some treatment for cramps. This did not relieve the pain. The division medical officer was notified at about 8 a. m. that there was a very sick man on board and was requested to see him at once. When examined at 8.10 a. m. temperature was 102.4; pulse, 62, of good volume and tension; respiration, 20. There was rather definite localized tenderness over the appendiceal region with more or less boardlike rigidity. Examination of the chest revealed nothing abnormal. A provisional diagnosis of acute appendicitis was made and the commanding officer notified that operation was deemed advisable at the earliest moment. It was, however, considered inadvisable to attempt this on board a destroyer, particularly as battle practice was then being held just off Bizerta, so the medical officer made arrangements for transfer to a hospital ashore.

Ice packs were ordered applied over the abdomen and, if need be, one-quarter gr. morphine to be given hypodermically to allay pain; though it was desired not to mask the symptom too much before further observation could be had. Shortly after lunch the patient was removed to the French naval hospital at Ferryville, Tunisia, where the diagnosis of appendicitis was concurred in. The operation was undertaken by two French surgeons shortly after patient was admitted, as the hospital had been notified previously as to the nature of the case. Ferryville is twelve miles from Bizerta, and it was impossible to procure an ambulance to make the trip; therefore a compartment in a second-class coach of the train was engaged and the patient, on one of the Navy standard stretchers, was put on board, the stretcher being placed lengthwise on one of the upholstered seats.

The operation was done under spinal anesthesia, what appeared to be novocain or procain being injected intra-spinaly at about the level of the fourth or fifth dorsal interspace. This was given with the patient sitting on the side of the operating table with body inclined forward. The spinal fluid seemed to be under no increase in pressure. Complete anesthesia apparently was obtained, for the patient was asked from time to time if he felt any pain and indicated that he did not.

The appendix was located and removed very readily, the actual cautery being used for burning off the appendix instead of cutting with the knife. This was

beautifully done. The appendiceal stump was then inverted by means of a purse-string suture. The surgeon then poured what was presumably ether into the peritoneal cavity. Up to this point the patient had behaved wonderfully well and his condition had been excellent. The pulse rate was about 80. Whether it was the reflex stimulation of the intestines by the sudden cooling effect of ether or the nauseating odor that brought on the vomiting can not be said, but the patient began vomiting a very greenish fluid, and for the moment it seemed that the ligature around the stump of the appendix had come off, as there was a hissing sound like that made by escaping gas. It was seen that this was not the case and the abdomen was closed in the usual way and patient returned to his bed.

Immediately after being put to bed the patient suffered slight difficulty in breathing. It is probable that this was the effect of the change of position, for the head was much lower than during the course of the operation. Heart action was good and no pallor of skin or mucous membranes was noted. He was assured that he would be all right, and one of his shipmates was left with him to watch after him for the next few hours and to notify the doctor if he saw any untoward change in his condition.

The appendix was examined macroscopically but not microscopically. It appeared to be perfectly normal except for a dark mass near the tip which was thought to be a fecolith.

During the following week the chief pharmacist's mate or division medical officer made almost daily visits to the hospital to get whatever information there was available. This was very meager, since the chart showed little other than temperature and pulse records. The patient's condition seemed good. After the seventh day the sutures were removed and the wound looked clean and the scar firm. He was given solid food for the first time the following day, having been kept pretty much on a milk diet up to this time. The ninth day post operative it was decided, with the consent of the hospital, to remove him to his ship, since it was scheduled to leave the next day for Malta, where it would be in company with U. S. S. *Pittsburgh*, to which he could be transferred if need arose.

The trip to Malta was without incident and for the first week or more the patient showed no ill effects from the trip nor from the rapid motion of a destroyer during gunnery practice. He had been up about the compartment for several days but was not permitted to go up the ladders, all of his needs being taken care of in the compartment. It was realized that such an arrangement was very unsatisfactory and unjust to others occupying this compartment.

Near the end of the stay in Malta the patient began running a very irregular temperature. It would go as high as 101°-103° F. in the afternoon and fall to normal by 8 the following morning. The patient complained of pain in the region of the operative scar, loss of appetite, and on one or two occasions vomited fluid similar to that vomited during the operation. As stated before, there are no facilities on destroyers for caring for the sick; no laboratory to aid one in making the diagnosis, and one must rely entirely on observation of the case. No evidence of tuberculosis was found. It was thought that possibly this was Malta or Mediterranean (undulating) fever. The patient received milk while in the hospital, though none had been used in Malta.

The ship left within the next three or four days for Trieste, Italy, and it was decided not to transfer the patient to the English naval hospital in Malta, as was first considered, but to carry him on to Trieste and leave him there if his condition had not improved upon arrival at that port.

On March 21, 1926, while en route to Trieste, the patient's condition became worse (temperature 101°, pulse 84, respiration 20), and he complained of severe

pain in the right side, with some nausea and tendency to vomit. The division medical officer was called on board, where he remained for the balance of the trip in order that he might watch the patient's condition. Phenacetin, quinine, and salol were administered during the night.

These seemed to be effective in easing the pain and reducing the temperature for the time. However, the following afternoon the temperature was above normal again and very much the same symptoms reappeared. On arrival in Trieste arrangements were made for transfer to the Italian military hospital, where he was removed the 24th of March.

Several doctors at this hospital examined him and, so far as could be ascertained, first thought there was an abscess forming around the old appendiceal stump. They used hot packs over this region in an attempt to localize the infection with a view to further surgical interference. This proved not to be an abscess or at any rate no further surgery was undertaken. The blood count showed a leucocytosis but it was not ascertained just how much. Also it was stated that the blood did not show *Micrococcus melitensis*. A smear from the urethra was taken and this contained gonococci. Treatment for gonorrhea was again resumed. On March 31, with the consent of the hospital authorities, the patient was again returned to the ship, it being deemed best not to leave him in the hospital after the ships left port. The chart showed a normal temperature for the last three days in the hospital, but the patient was very weak and emaciated. After returning aboard ship the same symptoms as before returned and, as a last resort, it was determined to try out mercurochrome in the hope that it might reach the seat of infection and do some good. On the morning of April 2 he was given 10 cubic centimeters of a 1 per cent solution, intravenously. No difficulty was experienced in getting into the vein and all of the solution was injected without spilling any in the superficial tissues.

No immediate reaction took place and the medical officer left the ship.

Sometime during the afternoon the temperature began to rise and reached a height of 105° F. before the middle of the afternoon. This lasted only a few hours, however, and by 8 o'clock that night the patient was feeling much better and the temperature had fallen somewhat. There was some diarrhea. The following day, the condition was decidedly improved, though the temperature continued to fluctuate between 98.6° and 101° F. One week later the same dose was given. This time the temperature rose only to 103° F. and there was less diarrhea. From this time on, the condition improved very rapidly, the appetite improved, the patient gained weight and color, and reported that he felt fine. He was given four subsequent injections at weekly intervals but had no further reactions. He was discharged to duty on the 22d of April, before the course of treatment had been completed, and at no time thereafter did he lose time from work either as a result of the disease or the mercurochrome treatment which he was still taking. It has been more than six months since he was discharged to duty and he has had no return of any symptoms. The weight increased to slightly above his normal, color returned to normal, all pain left, and he now looks as if he had never had a sick day in his life.

This case is reported with the hope that some comment may be made by others using this drug and that some light may be thrown on the true diagnosis in the case.

There seems to be no doubt as to the appendix being the offending organ at the time of operation, as a fecalith is enough to cause the

intense pain and other symptoms. The fact that he was just getting over gonorrhea leads one to wonder if it is not possible for this infection to travel up the spermatic cord and lead to much the same symptoms as are seen in women with salpingitis. It would be very easy to mistake this for appendicitis, as is so frequently done in treating women, where careful history is not taken and physical examination is not made. This hardly seems likely to be the cause of the irregular temperature and other symptoms which occurred after leaving the hospital in Ferryville, as in this type of infection one would expect a more or less constant fever rather than this undulating type. The question of Malta fever was raised but discarded on the grounds that one examination of blood failed to show the presence of *Micrococcus melitensis* and no other similar cases developed among the combined crews of six destroyers.

It has been noted with great pleasure that the division of destroyers now operating in European waters is fitted out for doing ordinary laboratory work, such as bacteriological examination for common bacteria, and for doing the Kahn precipitation test for syphilis. Also each destroyer of Division 25, it is said, is equipped with a dental sterilizer. This adds greatly to the facilities for carrying on medical work in this particular unit, since it is operating practically as an independent unit on detached duty. There is great need for one ship to act somewhat as a tender or hospital ship, with a small sick bay, say of four to six bunks, where men becoming bed patients may be taken care of without having them occupy bunks in the crew's quarters. Everyone knows what a source of nuisance this is. One destroyer could very easily have a sick bay of this type built in the starboard passageway in front of the radio shack. This space has been converted into officers' quarters on some of the destroyers in the Scouting Fleet. The chart houses on some of these destroyers are already being converted into staterooms for staff officers, and this arrangement might be made on those designated to carry the medical officer. Such an arrangement would be a great improvement to the divisions making the European cruise. Patients could be taken care of until they were ready for return to duty or there is opportunity for transfer to hospital or to a larger type of ship. Under such an arrangement the work would become more interesting to the medical officer. He would be given a chance to study his cases, broaden out professionally, and feel, and make the patients feel, that he is doing something for their health and comfort.

GREASE RACK FOR AUTOMOBILES

By A. FARENHOLT, Captain, Medical Corps, United States Navy

The necessity for a grease rack, or elevated automobile repair platform, was met at this station in the following homemade manner. The entire rack was made of metal and assembled from the material tabulated below.

2 12-inch channel iron lengths, 22½ pounds to the foot, 30 feet long, cost \$1 per foot.

8 columns of 5-inch wrought iron pipe, 36 inches long, cost 75 cents per foot.

4 columns of 5-inch wrought iron pipe, cut to fit sloping approach, cost 75 cents per foot.

24 flanges, 5-inch malleable iron, threaded and screwed to columns, cost \$1.60 each.

16 ½-inch round steel tie rods, cost 75 cents each.

3 2-inch standard angle-iron tie straps to bind sides of rack together, cost 50 cents each.

2 ¾-inch curved pieces of mild steel to form stop at distal end of rack, cost \$1 each.

Total cost of material, \$140.

Labor:—Services of one machinist for 24 hours.

This cost is that of new material purchased in open market. At any station, the same, or scrap of equal serviceability, may be obtained, and with available labor the actual cost would be little or nothing.

In place of the channel iron used as runways, I beams or angle iron shapes may be used. The columns may be of anything over 2½ inches and may also be of I beam, angle, or channel iron, or of any material capable of bearing the weight. The tie pieces may be of rod, strap, or angle shapes.

Total length of the incline, 15 feet.

Total length of the top platform, 16 feet.

Height of platform above ground, 36 inches.

A short movable stage, fitted to hang from the runway, may be used to facilitate exit or entry from the car and for working on the engine.

THE NAVAL RESERVE

HOSPITAL UNITS

Should a national emergency suddenly arise, the Bureau of Medicine and Surgery would have to provide hospital staffs for numerous station hospitals, base hospitals, and hospital ships. The source of these staffs would be the medical profession of the United States, scattered all over the country and over the scale of age and experience. To attempt a hurried organization of the medical profession for a military purpose would indeed be a Herculean task.

Accordingly it has been the aim of the Bureau of Medicine and Surgery to effect during time of peace a gradual organization of medical men into skeletal units. These units are to consist of medical men who are associates in civilian life, who know one another and who have demonstrated their ability to work together in harmony. Recognizing the futility of filling subordinate positions in an organization which will function at some future date, if at all, the bureau decided that the subordinate positions better be filled at the time of a national emergency, by the then recent medical graduates, who by virtue of their age and approximately identical professional qualifications would be available for assignment to any subordinate position in the group.

The plan formulated provides that the nucleus for a station hospital or hospital ship unit should consist of six specialists, each of whom must be capable of becoming the chief of his service; the six specialists being a surgeon, an internist, an urologist, a clinical pathologist, a Röntgenologist, and an ophthalmo-oto-laryngologist. Groups destined to form the staffs of base hospitals have two additional members—an assistant internist having experience in psychiatry and an assistant surgeon having experience in orthopedics. No limitation has been placed on the number of units formed in any one locality. In time of peace members of these groups are required to attend no drills and no training or other duty is required of them.

The plan calls for the organization of each group by a future member of that group, known as the organizer. He must be a man of sufficient academic seniority, age, and length of experience in his specialty to enable the department to give him such relative rank as to ensure his being senior to his associates.

The difficulties attending the selection of organizers and the other members of these skeletal units are quite considerable. The work of every medical man tends to make him rather individualistic, and the tendency is naturally much stronger among specialists. There is thus often developed a biased point of view, which can only be curbed by free association with men of other specialties. There is danger of friction arising from this cause in a great organization where men of widely differing experience become closely associated and must work together. The captain of the ship, for example, will be too courteous to disagree with the doctor who sees in every infringement of discipline an endocrine dysfunction sufficient to exonerate the culprit from malice aforethought. However, he will insist on his prerogative in applying the proper therapeutic measures. Experience has taught him that 90 per cent of such endocrine dysfunction is almost miraculously cured by five days solitary confinement on bread and water. An unreasonable attitude on the part of the doctor in such cases can only interfere with the primary purpose for which the Navy exists. The doctor who can not deal with every problem impersonally and with an open mind is a detriment to the service; and to avoid trouble, better be not appointed. Considerations such as these led the Bureau of Medicine and Surgery to the conclusion that selection of organizers and the other members of hospital units could not be made by the bureau. The commandants of the various districts were accordingly requested to investigate potential organizers within their districts. It was believed that the district medical officer, if he did not personally know the man, could easily get in touch with people who did. Provided the organizer was the proper type, the selection of other members of his unit could well be left to his own judgment.

Qualified specialists possessing officerlike qualities are originally appointed in the Volunteer Reserve for special service in the ranks of lieutenant and lieutenant commander, according to academic seniority, age, and length of experience in their specialty. The status of each applicant is established by credentials submitted with his application, and no professional examination is required. The credentials must include letters or certificates from two or more persons of good repute, testifying from personal knowledge to good habits and moral character; satisfactory evidence of citizenship; a certificate from the medical college which granted the degree of M. D., giving the name of school and date of graduation and signed by the dean or registrar; a certificate from the president or secretary of a State or local medical society, to the effect that the applicant is a member in good standing; a certificate of license to practice medicine. All papers, attached to the application, are sent to the com-

mandant of the naval district in which the applicant resides. In the case of former medical officers in the regular Navy or the Naval Reserve, no credentials need be submitted. The applicant is then authorized to appear for physical examination and will be required to conform to the standards by physical examination as prescribed for candidates for commission in the regular Navy and must be free from any defect or pathological condition which would interfere with the performance of the duty expected of him in the Navy. The Secretary of the Navy, however, may, in case of minor defect, waive this requirement, and, in especially desirable candidates, may waive the age requirement. For appointment as lieutenant a man must not be over 35 years of age, and for appointment as lieutenant commander must not be over 40 years of age. The report of the physical examination and all credentials are sent by the commandant to the Navy Department for consideration.

While it is only a few months since the various commandants were officially requested to aid in the selection of organizers, it is gratifying that the medical profession has responded so enthusiastically. In Philadelphia, three groups are in the process of organization, one group is being organized in Chicago, one at the Swedish Hospital, Seattle, one at the Mayo Clinic at Rochester, and in Massachusetts two officers of the Fleet Naval Reserve and one acting assistant surgeon of the regular Navy have signified their willingness to act as organizers. In addition there are several potential organizers whose applications are now under consideration. It is the policy of the Bureau of Medicine and Surgery to recommend appointment of men as organizers whose standing in the profession is such as to attract the best type of men into the Naval Reserve. Officers of the Naval Reserve, as well as those of the regular Navy will render a commendable patriotic service to their country if they will bring to the attention of the proper type of their medical confrères these rare opportunities.

The type of duty required of the different groups is varied. The younger men, anxious to travel, to be near the field of action, will prefer to become members of hospital ship units. While organized within a naval district they will be carried as unassigned by the Bureau of Medicine and Surgery and in time of a national emergency will be assigned as members of staffs of hospital ships. Some may prefer the units organized to staff station hospitals which will be assigned to duty by the commandant within their own naval district. Others will prefer base hospital units which will be available to relieve officers of the regular Navy who during time of peace are on duty at the base hospitals within the United States. A few units may organize for duty at future base hospitals which may be

established abroad, as necessity will require. Thus the individual doctor not only has the choice of following his specialty but knows just the type of duty he will perform and where, if called to active duty. He also knows who his associates will be, since the whole group will function as a unit. He will not be assured of these advantages if he waits until the eleventh hour.

Recent appointments, not published in previous issues of the Bulletin

Name	Rank	Class	Date appointed
Bender, Morris Samuel	Lieutenant	MC-V (G)	Dec. 14, 1926
Carter, F. R. Nicholas	Lieutenant (junior grade)	MC-V (G)	June 14, 1927
Chenery, Allan Jefferies	Lieutenant	MC-V (G)	Dec. 14, 1926
Clements, Albert Fred	Lieutenant (junior grade)	MC-V (G)	Jan. 5, 1927
Cooper, Howard N.	do.	MC-V (G)	May 11, 1927
Craig, Winchell McK.	Lieutenant	MC-V (S)	June 27, 1927
De Noon, Harry Lee, jr.	do.	MC-V (G)	May 18, 1927
Falconer, Fay Harvey	Lieutenant (junior grade)	MC-V (G)	Nov. 9, 1926
Greenwood, Lyle Archer	do.	MC-V (G)	Apr. 19, 1927
Hague, Robert Francis	do.	MC-V (G)	June 27, 1927
Heegler, Fred Dldier	do.	MC-V (G)	Apr. 8, 1927
Henry, Colvern Dewey	do.	MC-V (G)	June 14, 1927
Holder, Hall Gillam	do.	MC-V (G)	Nov. 18, 1926
Huber, Paul Robert	Lieutenant	MC-V (G)	May 26, 1927
Jagger, Seth Ransom	Lieutenant (junior grade)	MC-F	Apr. 20, 1927
Johnson, Brantley M.	do.	MC-V (G)	June 14, 1927
Jones, John F. X.	Lieutenant commander	MC-V (S)	May 5, 1927
Kalteyer, Frederick J.	do.	MC-V (S)	June 27, 1927
Keck, Herman	Lieutenant (junior grade)	MC-V (G)	Apr. 28, 1927
Kramer, Emil Francis	do.	MC-V (G)	May 18, 1927
Lane, Charles Walker	Lieutenant	MC-V (G)	Apr. 19, 1927
Lechenger, Gilbert Cecil	do.	MC-V (G)	Nov. 18, 1926
MacDonald, Francis Bethune	Lieutenant (junior grade)	MC-V (G)	Apr. 4, 1927
Magath, Thomas Byrd	Lieutenant	MC-V (S)	May 24, 1927
Manasses, Jacob Lippman	do.	MC-V (G)	May 5, 1927
Maupin, Jeremiah Gibson	Lieutenant commander	MC-V (S)	May 18, 1927
Meehan, George Edward	Lieutenant (junior grade)	MC-F	Apr. 20, 1927
Olsho, Sidney L.	Lieutenant commander	MC-V (S)	July 12, 1927
Perkins, Ralph Alonso	Lieutenant	MC-V (G)	July 19, 1926
Petrone, Francis Joseph	Lieutenant (junior grade)	MC-V (G)	June 3, 1927
Reymont, Anthony E.	do.	MC-V (G)	Nov. 9, 1926
Riebel, Francis Augustus	do.	MC-V (G)	July 6, 1927
Schumann, Edward Armin	Lieutenant commander	MC-V (S)	May 16, 1927
Snell, Albert Markley	Lieutenant	MC-V (S)	May 26, 1927
Spillman, Ramsay	Lieutenant (junior grade)	MC-V (G)	Dec. 14, 1926
Wheeler, Joseph Edward	do.	MC-V (G)	June 14, 1927

PROMOTIONS AND TRANSFERS

Lieut. Lloyd Belt Greene, MC-V (G), transferred to Class MC-V (S), June 18, 1927.

Lieut. Commander Samuel B. Burk, MC-V (S), transferred from Class MC-V (G) and promoted from lieutenant, Feb. 14, 1927.

Lieut. Commander William Evert Costolow, MC-V (S), transferred from Class MC-V (G) and promoted from lieutenant, Feb. 1, 1927.

Lieut. (Junior Grade) George A. Marsden, MC-V (G), transferred to Class MC-F on July 15, 1927.

Lieut. (Junior Grade) Drew Lodwick Davies, MC-V (G), transferred to Class MC-F July 15, 1927.

NURSE CORPS

The papers on dietetics in this number of the *BULLETIN* conclude a series of articles on this subject. Miss Miney was stationed at the United States naval hospital, New York, at the time her paper was submitted.

We are always interested to hear something about the work that ex-Navy nurses are doing. Mrs. Mabell S. C. Smith, of the publicity department of the Near East Relief, has forwarded for publication a brief sketch about Miss Agnes Evon, who was a member of the Navy Nurse Corps during the World War.

It is much more interesting to assist others in their work or to help carry out a given program if one has some understanding of the result to be accomplished.

Budgeting and accounting for the Naval hospitals, as a rule, is so much Greek to everyone, except those intimately associated with this important work. At the naval hospital, New York, a series of six lectures was given to the nurses on this subject and much interest was aroused. These few lectures were not expected to give the nurses a complete understanding of this complicated subject, but they did help to give them a clearer view of the importance of accounting. Miss Cooper's article was written from notes taken at these lectures.

THE LECTURES ON ACCOUNTING FROM A NURSE'S POINT OF VIEW

By MABEL T. COOPER, Chief Nurse, United States Navy

It is quite generally accepted that the relatively greater material prosperity of the United States is due, to a more or less extent, to our industrial efficiency; so, at this time, when the eyes of a large part of the world are upon this country because of its prosperity, it is very opportune that we do all within our power to live up to that reputation of efficiency, not only in the manufacture of automobiles, typewriters, or other mechanical devices, but in each and every form of industry. That is why so much stress is being laid upon the budget and accounting systems in the United States naval hospitals.

As in the factory, where it has been found necessary to interest each and every branch in order to get a perfect mechanism, so with

the Medical Corps of the Navy it is necessary that there be cooperation in all branches, as without cooperation we can not get efficiency. For this reason it was thought advisable for the nurses to have lectures in our accounting system.

First we learned a little of the history of the accounting system which went into effect July 1, 1923, and is an important part of the budget system.

The purpose of the budget of the naval hospitals, as well as the estimates of the other medical departments and activities, is to supply the Bureau of Medicine and Surgery with the information necessary to request appropriations from Congress.

In the same way the accounting system supplies the commanding officer with the necessary information for making his request from the Bureau of Medicine and Surgery for his budget for the year.

In the hospital the head of each department submits to the commanding officer a list of his wants and needs for the coming year. A chart has been drawn up for past expenditures and shows in one column the actual amount expended for the past fiscal year and, in another, the amount already expended in the present fiscal year. To this is added the estimated amount necessary for the remainder of the present fiscal year. In this way an estimate can be made under each classification, from the request submitted and from this expenditure sheet. It can readily be seen that economies can be accomplished which could not be done without a knowledge of the data that form a basis of comparison between one period and another. This estimate is sent to the Bureau of Medicine and Surgery, where it is carefully examined and, when approved, allotment cards covering the appropriations of each activity are sent to the hospital.

This budget system is not a thing peculiar to the service hospitals as it is becoming more and more the practice in civilian hospitals, and is recognized as the truly efficient way.

Next a detailed account of the sources from which funds are obtained to run our hospitals was taken up.

The first source, the Naval Hospital Fund, dates back to an act of Congress of July 16, 1798, which did not go into effect in the Navy, however, until September, 1799. This law stated that 20 cents a month should be deducted from the pay of each officer, seaman, and marine on the active and retired list, which should be used for the care and relief of the officers, seamen, and marines of the Navy when sick. Later when the Navy Nurse Corps was established they also paid their 20 cents a month. Sometimes one hears a nurse wonder about that deduction, but after a course of lectures such as these they would wonder no longer.

At the time the act went into effect there were no naval hospitals, so the patients were taken care of in civilian hospitals, with the result that there was more or less trouble in trying to exercise the proper military control over the service patients. In February, 1811, a law was passed providing for the construction of naval hospitals, but for 20 years no funds were available and the money that was being collected for the Naval Hospital Fund was used many times for other purposes than that for which it was intended.

Finally, in 1832, certain sums were appropriated by Congress, and the Secretary of the Navy was directed to build proper hospitals, at or near the navy yards at Charlestown, Mass., Brooklyn, N. Y., Philadelphia, Pa., Norfolk, Va., and Pensacola, Fla., and also the Naval Home at Philadelphia.

Since then the Naval Hospital Fund has been used for these hospitals and others as they have been built from time to time.

Other money is obtained for the Naval Hospital Fund from court-martial money, forfeiture on account of desertion, the cost of one ration per day for each member of the personnel subsisted in the naval hospitals and each naval and marine officer and man admitted to the naval hospitals, from the money paid by the Employee's Compensation Commission for the care of navy yard employees in the hospitals, and by the Veterans' Bureau for the care of Veterans' Bureau patients in the naval hospitals.

In 1855 land owned by the naval hospital, Chelsea, Mass., and in 1890 land owned by the naval hospital, Brooklyn, N. Y., was sold and the money received in each case was added to the Naval Hospital Fund.

Formerly Congress made an annual appropriation toward the Naval Hospital Fund, but this has not been done since 1890. Appropriations are, however made annually for the "Care of the dead."¹

Having learned the reason for the budget, and knowing whence the money came for the maintenance of the naval hospitals, we learned in the second lecture the various methods of securing supplies and of making expenditures.

¹ The appropriation "Medical Department" is the largest appropriation obtained from Congress for the maintenance and operation of the Medical Department of the Navy. The moneys provided by this act are expended for definite supplies and services at naval hospitals, as set forth in the language of the act, the larger amounts being expended for civilian help, transportation, upkeep and care of the grounds. This appropriation is used entirely for the purchase of medical and surgical supplies at medical supply depots and for the maintenance and operation of all Medical Department activities other than hospitals and hospital ships, the reason for this being that the Naval Hospital Fund can only be used at naval hospitals or aboard hospital ships and then only for specific purposes. The last statement may be modified to the extent that the Naval Hospital Fund is used for the treatment and care of service personnel in other than naval hospitals. It being in general held that, inasmuch as the fund is maintained in part by the personnel of the service, they have a right to such fund for their treatment and care in civil hospitals and for other professional services when medical and dental facilities of the Navy are not available.

First, "Open purchase," which is used for things necessary for the hospitals but which can not be obtained from the supply officer or the medical supply depot or on local provision contract. This method can be used only when there is money available on the allotment cards. At one time open purchase was used much more than at the present time, because there was not nearly so much on the supply table as at present. Having a larger supply table makes it easier for the naval hospitals to get supplies and also, by making larger purchases and standardizing equipment, the buying of supplies is much more economical.

Next the annual or blanket requisitions were taken up; that is, the various sums that have been allotted for the various departments and how they are used. As an illustration of this, a certain sum has been requested and approved for the repair of surgical instruments, so when instruments need repair they can be sent to the selected firm, i. e., the lowest bidder who will fulfill specifications, to be repaired, provided that they do not cost more than the amount appropriated for that purpose for that quarter.

Next, the various supplies which can be obtained on the supply depot stub requisition, such as mess gear, cleaning, engineer's and mechanic's supplies, were discussed. All of these are obtained on the so-called stub requisitions, but are all price listed and an account is kept of the amounts spent by the various hospitals for such articles and comparisons made from time to time.

Next, the hospital, surgical, medical, and drug supplies obtainable on Form 4 requisition from our medical supply depot were taken up. A new supply table was exhibited. Certain supplies used in the laboratory are obtainable from the naval medical school, Washington, D. C., on letter request.

In spite of the fact that there are so many provisions made for the various purchases in the hospital, it is sometimes necessary to make emergency purchases. These are things that have to be obtained by open purchase, for which no previous provision has been made, and there is not enough time to go through the regular routine of getting permission from the Bureau of Medicine and Surgery. These purchases can be made upon approval by the commandant of the district, but are seldom necessary, especially if the proper thought be given the preparation of the budget. If used, however, a report must be sent to the Bureau of Medicine and Surgery as soon as possible.

The third lecture was upon the "Control of equipment and supplies," and we were shown the various cards, ledger sheets, and books which are necessary for the bookkeeping, and the methods of making the various entries were explained. The uses of Forms R

and 11 were dwelt upon extensively to bring out the difference between nonexpendable and expendable articles and the necessity of making the forms so they can be used for permanent records.

The fourth lecture dwelt extensively upon accounting for non-expendable articles. The responsibility for their care rests with the commanding officer, but he in turn will hold his subordinate officers and personnel responsible for their departments. The commanding officer is the only one who has authority (it must be in writing) to allow any of these articles to leave the station, and they can not be moved from one station to another, or turned into a navy yard for storage, without authority from the Bureau of Medicine and Surgery.

An account of all nonexpendable articles is kept in an equipment ledger and also on the property location cards; the latter show just where every nonexpendable article is located. These cards, if kept up to date, are of great assistance when taking the annual inventory, which must be sent to the Bureau of Medicine and Surgery the 1st of July, each year. If proper care is taken when transferring property from one ward or activity to another, or placing articles in storage, and to fill out Form 11 properly, there should be very little difficulty in keeping the property location cards up to date, but unfortunately this is not always done.

All articles missing can be surveyed as missing, but needless to say no efficient hospital will have an excess of missing articles.

An account of expendable articles is kept in the stores ledger and also on talley cards. This keeps the storekeeper informed at all times of the amount of stores on hand so that any article can be replaced when the supply is getting low, and they also show the amount of the various articles that are being expended. New supplies are obtained on stub requisitions from the supply officer, Navy supply depot. The ledger sheets are interesting and instructive in comparing departments, of which we shall speak later.

The fifth lecture was devoted to the disposal of wornout and obsolete equipment and their replacement. All nonexpendable articles, if practicable, should be surveyed before replacement. Usually the article is placed in storage until a reasonable amount has accumulated, then an order is issued by the commanding officer for a board of survey to meet to make a report of the survey. This report is sent to the Bureau of Medicine and Surgery. Nothing can be done with the articles until an answer comes from the bureau as to the method of their disposal. As stated before, all missing articles are surveyed as missing after due effort has been made to find them. When approved by the Bureau of Medicine and Surgery and available funds are on the allotment cards, new articles may be obtained to take their places,

either from the supply table or by open purchase. It can easily be seen how important it is that care should be taken to have the budget made so that it will cover these running expenses, for although it is possible to get extra money from the department if the allowance set aside is used up, it will take more time and be a great deal more trouble to everybody. These surveys are held as often as necessary. In a large active hospital like Brooklyn it is often necessary to hold them as often as once a month in order to prevent having too much unusable property on hand at a time.

The sixth and last lecture was on the expenditure of common articles of equipment and supplies, covering a period of four months and comparing the various wards and departments. These sheets are inspected regularly by the commanding officer, and whenever it seems that there is room for improvement he will call the attention of the staff to the matter at the weekly staff meetings, or if it is a matter which concerns an individual or a single department or two the persons responsible will be consulted.

These sheets are now put in the nurses' quarters once a month, giving them an opportunity to compare their departments and creating quite a little interest and more or less friendly rivalry.

However interesting figures may be, we must not forget that patients are not like automobiles. We can not standardize them, and even if we could it would not be for the best good of the American people to do so. One group of patients will demand a great deal more equipment and more supplies than another group on the same reservation, where conditions are very nearly the same; whereas groups of the same size on various reservations, with the difference of location considered, will vary even more. Perhaps here in Brooklyn, being situated where it makes it especially hard to keep the hospital in the proper state of cleanliness, we consider this element more than some more fortunately located hospitals might. After all it is the best results on the least expenditure that we are after, as that alone is true efficiency. We feel that is what the nurses are more anxious than ever to accomplish and that they are better able to do so now because of the information they have received in these lectures and the interest which has been aroused.

ADDRESS TO THE CLASS OF 1926 HAITIAN GENERAL HOSPITAL TRAINING SCHOOL FOR NURSES

By C. ST. J. BUTLER, Captain, Medical Corps, United States Navy

Good government, some one has said, constitutes the highest expression of civilization. The poet Juvenal reminded the Romans that a sound mind in a sound body makes for greatness in the indi-

vidual, and this prepares us to believe in the modern view that national greatness lies in national health, for a nation is but a collection of individuals.

It is a fundamental characteristic of the human being to turn to some form of physician when bodily ills beset him. He will seek relief for his ills from the "stone-age medicine man" if no better be available. Next after a church and a school the chief need and greatest adornment of any community is a hospital. Indeed, the state of advancement of any nation may adequately be determined by a visit to its hospitals.

The present Government of Haiti has very wisely given support to institutions which elevate the standards of public health throughout the Republic. One of the most important of these institutions is the Nurses' Training School for Haitian women. As we said in addressing last year's graduating class, the trained nurse is, next after the physician, the most important unit of personnel connected with public health organization. Without her trained and sympathetic touch a hospital becomes simply a barracks for the housing of sick people, and an operating room becomes a "carpenter shop" where mere man saws and cuts and nails and sews. That primitive appeal which snatches many weary souls from the jaws of death and makes them content to live on is not one of the marked assets of the human male. Therefore no one can take woman's place in the modern hospital.

In order that a trained nurse may serve best in the calling which she has chosen it is not alone necessary that she should be patient, industrious, and sympathetic. You have each shown these qualities to a sufficient degree to make you the objects of our congratulations to-day when you are handed your diplomas. A further quality of greatest value to the trained nurse is that of loyalty to the traditions of the profession in which she serves. Loyalty is a quality which shows in actions. It is not necessarily coincident with words. "A slender acquaintance with the world must convince every man that actions, not words, are the true criterion of the attachment of friends, and that the most liberal professions of good will are very far from being the truest marks of it." (George Washington.)

I would therefore recommend that you learn to think of your teachers here in this school, Red Cross instructors, Catholic sisters, and physicians, the people who have trained you in your honorable calling, and, last but not least, of the Government which has supported you and will continue to support you, in the light of very good friends, and that you show by your actions at all times that you are loyal to them.

A NAVY NURSE IN THE NEAR EAST

By MABELL S. C. SMITH

Agnes Evon will be remembered with gratitude by such of the men as were so fortunate as to have her care when they were out of luck and needed it most. Since she left the Navy nurses she has worked with disabled veterans, the Red Cross, the American Women's Hospital, and Near East Relief. She was in Constantinople at the time of the Smyrna disaster and joined a medical unit that was sent at once across the *Ægean* on an American destroyer. With American marines she saved the lives of many, most of them little children. Her own life she probably owes to the insistence of a long-legged marine who dragged her to safety out of the fire zone through crowded streets, along the quay, and even over the rough backs of two recumbent water buffalo.

In Athens she joined the American Women's Hospital and devoted herself to caring for the refugees from this terrible spot, nursing them in the many temporary camps that were set up and trying to aid them in their splendid effort to establish themselves without goods and without money in a strange country, generous, but burdened with food, housing, and unemployment problems.

Sent to Beirut, Syria, by Near East Relief, Miss Evon became director of its nursing service in that area. Near East Relief work is almost exclusively with orphaned children, so Miss Evon had supervision of such nursing work as was done in the orphanages in the neighborhood. In addition she headed the nursing force at the clinic and Day Nursery founded to aid the unfortunate Armenians who live in the refugee camp on the edge of the city.

In the course of fulfilling these duties she found so much suffering among the women because of the lack of proper medical and nursing attention that she determined in some way to raise the money to build a maternity hospital. There is in Beirut a club of American and British women interested in civic and social welfare. It was not hard to convince them of the benefit, not only to the poor women but to the town, of such an institution, and they set themselves to collecting the funds. The Beirut relief committee promised a generous part of the upkeep and the Near East Relief gave as its donation the medical and nursing service. The new building was put up near the clinic and day nursery so that the doctors and nurses might cover all three duties without waste of time. It is small—only 14 beds—but the little place is sufficiently equipped, and with its fresh blue and white curtains and new splint market baskets, which serve as cradles and means of transportation for the babies, it is a cheerful spot.

Miss Evon is returning to the United States soon, leaving this hospital behind her as her latest good work. Everyone who knows her believes that it will not long remain "the latest." She is sure to be starting something else soon.

DIETETICS

By ANNA P. SMITH, Nurse, United States Navy

As the therapeutic value of foods is becoming more and more recognized, there is a constantly growing desire to utilize special diets for many acute and chronic diseases.

In the treatment of chronic diseases, regulation of the diet is perhaps the most important single measure, because oftentimes the disorder has been brought about by improper habits in eating. The needs of an individual who is laid up with a broken leg and one convalescing from an acute or wasting infectious disease are quite different.

In obesity, diet is the most important factor, not a starvation treatment but a scientific diet, so as to prevent any serious after-effects. The accumulation of fat in the tissues is either due to an excess of food combined with too little exercise or it is a true disease, in which case fat is deposited in spite of a small ration. The protein allowance should be kept at a good quantity to prevent unnecessary protein loss, cutting down on the fats and carbohydrates to keep the caloric value low. A generous supply of water is necessary, best taken between meals, as water with meals makes it easier to take larger quantities of food; therefore, water drinking at meal time should be very limited or even none allowed.

Diabetes depends entirely upon diet. All food allowed in such cases must be weighed, and that not consumed weighed after each meal, thus determining the exact amount eaten. This is the only satisfactory way to arrive at an accurate conclusion as to what constitutes the individual's carbohydrate tolerance, and is the only means of using the diet successfully. It is necessary to allow only one-half the amount of the carbohydrate tolerance because, while the urine becomes sugar free on the full amount of the tolerance, the blood does not always do so, and in order to reduce the sugar content of the blood to normal or as nearly so as may be, the lessened amount of carbohydrate, only, is allowed. The increase must be gradual, the object being to allow, little by little, more carbohydrate but not enough to show in the urine. As soon as the patient is free from sugar, 150 grams of the 5 per cent vegetables are given, then 5 grams of carbohydrate daily up to 20 grams, then 5 grams every other day, passing successively upward through the 5, 10, and 15 per cent

vegetables and 5 and 10 per cent foods. Fat is added last of all and of course a small amount is given in the meat and eggs. The diet is regulated by the physician in charge of these cases.

Many gastric and duodenal ulcers are cured by diet. The reputation of the Lenhartz diet in the treatment of peptic ulcer is well established. Before the introduction of this diet, it had been thought necessary to starve or practically starve patients with acute peptic ulcer, for a week or two. A 12-hour rest is given the stomach. There is a deep rooted and reasonable prejudice against the use of any hard substance in the diet used in the treatment of gastric ulcer, either acute or chronic, and wherever this occurs in the Lenhartz diet, it is advisable to substitute soaked toast or bread for zwieback. A convenient method of using the Lenhartz diet is to have each day's diet written on a card which is hung with the patient's chart.

In hyperacidity of the stomach, bland foods should be given with a low carbohydrate diet to prevent fermentation, plenty of easily digested fats to retard the flow of gastric juice, and enough protein to use up all of the free hydrochloric acid. The best kind of animal protein is found in eggs, milk, and boiled fish.

Fevers of long duration should have a high caloric diet. This includes illnesses such as typhoid fever, scarlet fever, and often diphtheria and pneumonia. Milk and eggs should be the basis of the diet. Nephritis requires very careful feeding. A farinaceous diet is suitable in this case. If there is nitrogen retention, all of the protein possible should be eliminated; in edema, the fluid intake must be limited and the patient given a salt-poor diet. When green vegetables are given, they must be boiled in two waters to remove most of the salt.

In catarrhal jaundice, give as little fat as possible and restrict the carbohydrates somewhat. If the jaundice is caused by gallstones, a diet is of no benefit, but some help can be given to avoid the recurrence of stones by giving a diet which prevents constipation and intestinal putrefaction. The anticonstipation diet should consist of foods which provide a large residue. In general, it may be said that these cases need fruits, cooked or raw, and two or three times the amount of green vegetables that one normally consumes. It is only by constant effort and encouragement that patients can be brought to take this for they feel they are eating too much food.

Diet also plays an important part in the treatment of surgical cases. After an operation for hemorrhoids it is desirable to give a diet with as little residue as possible. A clear fluid is given during the first three days, after that, a soft diet is given. Laparotomy patients are usually constipated after operation. This condition can be corrected by a laxative diet.

The physician orders his diets either in terms of foodstuffs, as grams of carbohydrates, fat, and protein or he gives the diagnosis of his case and orders a diet suitable for nephritis or catarrhal jaundice, or whatever it may be, and leaves the matter of foods to be allowed to be worked out by the dietitian. If a certain diet is preferred, he orders it by name, as Sippy or Lenhartz diet. Each day's menu is given, and the special diets are prepared in the special-diet kitchen by the dietitian and her assistant.

Regular house diets, convalescent diets and soft diets speak for themselves and are of particular use in hospital dietaries. The variety of foods included is extensive. Should one desire to keep expenses at a low level, this can easily be done by substituting the less expensive foodstuffs, keeping, however, to the same general plan. Convalescent diets should be of a high nutritive value, more easily digestible, and contain more protein.

Soft diet represents an intermediate step between fluid and milk, and convalescent and regular diet. It need not be so strictly adhered to in point of food values, as a patient's appetite can be relied upon at this stage to make him take sufficient quantity. However, it is well to have this diet standardized for economy in planning.

While fluid diet contains a fair amount of protein food, it is of exceedingly low caloric value, but is especially good during the first day or two of any acute illness when one wishes to rest the organs without subjecting them to protein starvation. Milk diet is of use for a time, particularly in an acute and occasionally in a chronic renal condition. The greatest objection to a milk diet is that, in order to get the necessary calories for a man, he must take such large amounts, 3 to 4 quarts daily. This would mean that the patient must consume 100 to 130 grams of protein, an unnecessary strain to put upon excretory organs, already disabled by disease. While we give not more than 3 quarts per day for a milk diet, it must be remembered that this should not be continued indefinitely.

It is the duty of the dietitian to see that all food is properly prepared and served. She is pledged to be of whatever service she can in helping to make the patients' meals a pleasure.

• **DIETETICS**

By MARY J. MINEX, Nurse, United States Navy

Dietetics plays a very important rôle in the treatment of various cases in the hospital. Diets which I have been preparing of late are, Minot, Mosenthal, obesity, constipation, fat free, purin free, nephritic, diabetic, and psoriasis.

The Minot diet is the most recently added diet prepared at this hospital and the results obtained have been most gratifying. It is given to patients suffering from pernicious anemia. These cases usually have trouble in digesting fat and the carbohydrates and fats are limited. Beef or calf's liver is the meat used as a rule, as it is lowest in fat.

The diet prescribed for nephritic patients contains no salt, eggs, or meat. Although these items must, of necessity, be omitted, it is possible to prepare a very satisfying diet. Chicken is served twice a week and fish once a week. Fruits and vegetables may be given, although celery and onions are vegetables to be avoided as they contain an acid which irritates the kidneys. The Mosenthal test diet is given to the nephritic patients on the Monday following their admittance to the hospital. Monday is selected as it is most convenient for the laboratory to make the tests on that particular day.

Patients on obesity diet are few and they are rarely found among service men. In hepatic cases fats are poorly digested and absorbed. This is sometimes due to an obstruction in the duct which interferes with the flow of bile. These cases are usually on a fat-free diet. Goiter cases are put on a purin-free diet. Psoriasis patients have a diet prescribed which is composed mostly of vegetables, the protein being kept very low.

The diabetic diet is very interesting. It is worth while to watch the urine and blood sugar findings in these cases, with the increase or decrease of insulin and food. These diets are calculated. The food is weighed in the diet kitchen and set upon trays, the trays for the bed patients being sent to the wards. Diabetic patients attend lectures given by the ward medical officer on their case, treatment, and diet. On the day of discharge the patient visits the dietitian to get a copy of the diet he has been having. After leaving the hospital he is visited at frequent intervals in his home by a nurse supplied by the Red Cross. In this way a strict watch is kept on him, and if he shows signs of more sugar than usual he returns to the hospital.

The majority of patients on special diets adhere to them, but occasionally a patient does not cooperate. The noncooperative type of patient is, as a general rule, the patient for whom an obesity diet has been prescribed.

PREPARATION OF MENUS

In the preparation of menus, there are many things to be taken into consideration:

1. Adequate calories to meet energy needs.
2. Adequate amounts and kinds of nutrients, organic and inorganic.

3. Proper quality in the nutrients selected.
4. Sequence of food.
5. Color schemes.
6. Variety.

The appetite of a sick person very often must be tempted. Food must be prepared carefully and arranged daintily so that an appetite may be aroused if possible.

SERVING OF FOOD

From the dietetic prescription in the wards to the delivery in palatable form is a long procedure. Even though the ward medical officer, as a result of careful consideration of the patient's need, has inscribed in the order book his dietetic order, and even though the diet kitchen has properly prepared this form of treatment, improper delivery methods may bring any good work already done, to naught. Therefore, any description of procedure, which has as the ultimate aim the furnishing of food, whether it is to be provided as part of the treatment of disease or whether it is only to supply the means of maintaining health and strength, must consider the following steps:

1. Scientific and well thought out dietary prescriptions by the ward medical officer.
2. The transmission of these orders to the diet kitchen.
3. The translation of these requests into the quantities of raw materials required.
4. The requisition of the dietitian for these materials from the commissary.
5. The delivery of these goods and their inspection.
6. The preparation of palatable and properly combined dietary prescriptions from the raw materials.
7. The transportation of these diets to the ward and the proper serving of the food to the patient.

All ambulant patients on special diets are served in the diet kitchen over the counter. When the patients file in, bread, dessert, soup, milk, and cocoa are ready. Each patient in his turn takes these items as he files past; thus, the only delay is in the serving of hot food on his plate. This plan is the quickest and most orderly.

WARDS

At the present time, we are experimenting with the food cart in the surgical ward. The trays and dishes of bed patients are put on their lockers and the cart is wheeled into the ward, stopping at each bed. Patients, being served in this way, can reject anything they do not want. This saves food which, served by the other method, is wasted, and the food is warmer. It takes longer to serve patients in

this way, but this is compensated for when one takes into consideration the advantages listed above. The other wards are served with food which is carried over in aluminum containers.

The food for sick officers who are bed patients is put on trays in the diet kitchen. Whenever sick officers' quarters are near enough to the diet kitchen so that food may be sent on trays instead of in containers, it looks more attractive when it reaches the patient, as this method does not necessitate handling the food twice. In setting up these trays, patients' preferences are remembered and special attention is paid to the appearance of silver and linen. Ambulant officers on special, soft, or regular diet, are served in a dining room, which is off the diet kitchen. These diets are under the supervision of the dietitian. This method decreases the number of trays sent to sick officers' quarters.

REFERENCES

- Nutrition and Clinical Dietetics—Carter, Howe, Mason.
Practical Dietetics—Pattee.
The Trained Nurse.
The Modern Hospital.

NOTES AND COMMENTS

CORRECTION

In the article in the July, 1927, number of the UNITED STATES NAVAL MEDICAL BULLETIN, entitled "The treatment of chancroids and other lesions with ammoniacal silver nitrate and formalin," by P. G. White, commander, Dental Corps, and J. Q. Owsley, lieutenant (junior grade), Medical Corps, United States Navy, it is stated that "Full equipment packages, as put up by the manufacturer, containing applicator tubes, dispensing dishes, and ampules can be obtained from the medical supply depot, Brooklyn, N. Y." *As the value of this treatment has not been fully established, the supply depot is not prepared to issue these packages.*

REPORT OF TREATMENT OF CHINESE WOUNDED

That fighting in China no longer consists of attempts to frighten the enemy by loud noises, but has assumed the aspects of modern warfare, is brought out clearly by Dr. J. L. McCartney in his article on Chinese military medicine in this issue.

In this connection, a report on the care of the wounded Chinese soldiers at Nan Yuan Barracks, Peking, submitted by Capt. C. M. Oman, Medical Corps, United States Navy, in January, 1926, is of interest.

The report follows:

Herewith is submitted a report, based on personal observations, relative to conditions in connection with the hospitalization and treatment of some 4,000 wounded Chinese soldiers which resulted from the hostilities surrounding the recent capture of Tientsin by the troops of Marshal Feng Yu Hsiang.

There have been innumerable wars fought in China during the past thousands of years, and at this present moment there are 14 separate wars in progress throughout this land. As years have gone by they have adopted methods of fighting based on western ideas, and this conflict in question was fought with modern man-killing weapons, as will be readily seen from the data submitted in this report.

However, despite their improvement in implements of warfare, tactics, strategy, etc., they have not kept pace with their preparations for the care of the resulting wounded. One sees troops by the thousands marching through the streets of Peking. At intervals in the line there is a Red Cross squad, with the flag flying and camels, donkeys, and carts carrying supplies and tents.

But this conveys a false impression. Marshal Feng has a medical department made up of doctors and "dressing men," but they are poorly trained, totally inadequate in number, and have no conception of what might be demanded of them.

Heretofore very little effort has been made to render much assistance to the wounded by the Chinese themselves, and various mission hospitals have practically been their only means of aid. No preparation seems to be made for the wounded, despite constant warfare.

In this battle under discussion there were roughly 125,000 men engaged. General Li Ching-lin was defending Tientsin with about 60,000 and had entrenched about 15 miles outside. Marshal Feng Yu Hsiang attacked. It might be stated here that this is about the first battle of any note which the Chinese have ever fought in winter weather. Generally they time their wars to suit their convenience; after the crops are gathered; before cold weather or before the rainy season. During the two weeks of this battle the weather was bitterly cold, zero and below many times.

Marshal Feng Yu Hsiang apparently thought he would have rather an easy time capturing Tientsin, but he was sadly mistaken. We have no definite data relative to the number of casualties on either side but we do know that 4,208—all Feng's men with the exception of 300 of the enemy—were treated by us at Nan Yuan Barracks, about 7 miles from Peking and 70 miles from the zone of action.

The real fighting began December 11, 1925. The next day about 100 wounded arrived at Peking and were taken to the Peking Union Medical College Hospital and to the Central Hospital, a hospital under Chinese management. The number soon was so great they could not be accommodated in these hospitals, and they were then taken to Nan Yuan Barracks.

These barracks are large, one-storied, Chinese brick barrack buildings. One section had been used as a hospital when the barracks had been occupied by troops, but about four months before the equipment and medical personnel had been removed to Kalgan, about 150 miles distant. No provision had been made to reestablish a hospital here when hostilities began. There were about 150 beds piled up in a building but practically no other equipment. There was an X-ray machine in fairly good condition, but no one to run it.

The wounded came in so rapidly that the authorities of the Peking Union Medical College Hospital, on their own initiative, went down and took charge on December 13, 1925, their doctors, nurses, and some foreign and a few Chinese civilians responding. At this time there were about 300 wounded there and nothing had been done for them. The X-ray department was organized, lights rigged, operating room outfitted, and instruments, rubber gloves, splints, etc., provided.

Owing to the efficiency and zeal of the medical staff of the Peking Union Medical College Hospital order out of chaos was soon established and the X-ray department and operating room functioned next day. An admission building or "triage" was started and all cases went through here. The slightly wounded were turned over to the military who had charge of some courts, while the seriously wounded were taken charge of by the staff of the Peking Union Medical College Hospital.

The wounded came in rapidly, about 1,000 the first four days and then 1,500 more in the next three days. The greater number were received from two to three days after injury, very few within 24 hours. The wounds were of all types suggesting fighting of armies using modern weapons of warfare. They were, as a rule, bandaged and some had iodine painted on and iodoform

dusted in the wounds. A few had splints of an inadequate type and poorly applied. Not a "Thomas" splint was seen on any of the wounded received, but it is quite evident that there was some form of first-aid at the front. A great many of the wounds were of a very severe nature.

From the character of the wounds it was very evident that the mortality on the field of battle must have been high. From a perusal of the accompanying tables one will see the very small number of abdominal and chest wounds which were received. The great majority of these must have been killed outright or died before any assistance was rendered. None of the men had received tetanus antitoxin, but within a short time after arrival at Nan Yuan a prophylactic dose was given to about 800. It is of interest to note that up to January 10, 1926, although 45 cases of tetanus had developed, not one of the 800 had been affected. It might be mentioned here that a few days after opening this hospital one case of smallpox was recognized, but, on investigation, it was found, to the surprise of all, that about 99 per cent of Marshal Feng's men had been protected by vaccination. A few cases of typhus appeared.

The men are well and warmly clothed, appear well fed, and average about 19 or 20 years of age. They are a very patient, stoical lot of men and complaints are rare. The barracks adapted themselves very well to the care of the wounded, being well heated by coal stoves. Beds are scarce and a great many lie on straw, but this is not such a hardship for a Chinese soldier as one might imagine. Good hot soup was furnished. An incinerator was soon built and a brick "de-louser" was constructed.

The X-ray department worked most efficiently and all cases went through it. Here foreign bodies were localized and marked on the skin, fractures made out, and these data typewritten on a tag which accompanied the patient to the adjoining room, which was the operating room.

Briefly, the technique employed in the operating room was this: There were three tables with the instrument table more or less in the center; one instrument nurse passed instruments and dressings by means of sterile forceps to the tables. After using instruments they were dropped in a basin, removed by another nurse and washed and sterilized. The surgeon and assistant wore caps, masks, gowns, and rubber gloves but did not change between operations, merely washing gloved hands in water, 1:1000 bichloride, and alcohol. Time was urgent and gloves and gowns scarce and practically all cases were infected.

Wounds were freely incised, foreign bodies such as pieces of clothing, stones, wood, bullets, shrapnel, etc., removed, hemorrhage controlled, and wet hot dressings were applied. Dakin's treatment was not attempted because of the lack of nurses. Amputations were left freely open. Thomas splints were applied to fractures. A great many had multiple and severe injuries and took considerable time.

Chloroform anesthesia was used because of the quick induction, rapid recovery, and because it lessened the chance of pneumonia. In over 1,000 chloroform anesthetics there was not one death in the operating room. Members of my Hospital Corps administered chloroform anesthesia very efficiently.

During the first four days no record was kept in the operating room, but later a brief description of operation accompanied each patient to ward. A record of 729 operations is actually given on the accompanying charts, but well over 1,000 were done up to January 10, averaging about 40 per day. Fighting ceased December 24, 1925, and then of course the hours in the operating room were lessened.

The wounded apparently put explicit faith in the foreign doctors, and rarely was there the least sign of fear or any expression of remonstrance as they were carried into the operating room and saw what was transpiring on the other two tables. The discipline of Feng's army is good, and no smoking of opium, cigarettes, or drinking of liquor was seen.

Up to January 10, 4,208 wounded had been admitted, 300 of which were prisoners. A great many of the wounds were healing and had not been infected when received.

It can readily be imagined what a task it was to dress the various operative and fracture cases, but various missionary institutions responded nobly. The cases have done remarkably well and there have been only 245 deaths among the 4,208.

The accompanying charts speak for themselves and will give a general idea as to the character and distribution of the wounds. It might be stated here that some of the worst cases were sent to the Peking Union Medical College Hospital, where they had some 15 amputations and thirty-odd deaths.

It was noted that a great many of the wounds were through and through, probably machine gun. Among the foreign bodies high explosive and shrapnel predominated. Only one bayonet wound was seen, and that may have been self-inflicted. There was some evidence of frozen feet and hands. It must be remembered that the weather was absolutely dry, and the Chinese soldiers wear loose shoes and no binding leggings.

I have to thank Dr. Mont Reid and the other members of the staff of the Peking Union Medical College Hospital for the data submitted. To them alone is due the credit of the organization and running of this hospital.

The two medical officers and members of the Hospital Corps attached to the marine detachment, American Legation Guard, Peking, China, spent from six to eight hours daily for over two weeks at Nan Yuan Barracks. For some days the writer ran one table and had general supervision of the operating room in the afternoon. Valuable experience was gained by us all. The Hospital Corps men were most enthusiastic and administered anesthetics, assisted at operations, worked in the X-ray room, and jumped in wherever they could be of any assistance.

It must be remembered that the data submitted do not tend to give an accurate idea of the exact number of the various injuries or the nature of them. They merely detail what actually went through our hands. Due to the stress of work, inability of the Chinese military to grasp the idea of what was going on, and the general apathy of a great many of the soldiers, many cases were lost in the shuffle.

TABLE 1.—*Summary of histories, Nan Yuan Barracks, Peking, China*

Site of injury	Fracture	Abrasions, lacerations, shell wounds	Through and through	Total
Head.....	8	28	18	54
Neck.....		7	1	8
Chest.....		18	31	49
Abdomen.....		4	12	16
Back, groin, hips.....		6	5	11
Lumbar region.....		6		6
Shoulders.....		19	29	48
Arms.....	33	27	31	91
Elbow.....	1	2	1	4
Forearm.....	17	22	19	58

TABLE 1.—*Summary of histories, Nan Yuan Barracks, Peking, China—Contd.*

Site of injury	Fracture	Abrasions, lacerations, shell wounds	Through and through	Total
Wrist.....	1	7		8
Hands and fingers.....	11	40	10	61
Buttocks and pelvis.....	2	27	7	36
Thighs.....	22	65	31	118
Knees.....		5		5
Legs.....	17	47	20	84
Ankles.....		9	3	12
Foot.....	1	26	4	31
Gangrene of foot.....				6
Upper extremities not specified.....				43
Lower extremities not specified.....				41
Aneurism.....				2
Total.....	113	365	222	792

TABLE 2.—*Operations recorded*

Nature of operation	Total number	Per cent
Incision and drainage.....	343	47.0
Incision and drainage with extraction of foreign bodies or bone pieces.....	154	21.0
Dressings and manipulations.....	106	14.0
Amputations.....	59	8.0
Débridements.....	30	4.1
Ligation for hemorrhage.....	15	2.1
Thoracostomy, or resection of rib.....	14	2.0
Enucleation of eye.....	7	1.0
Orchidectomy (one side).....	1	0.1
Total.....	729	

TABLE 3.—*Distribution of regions operated*

Region	Total number	Per cent	Region	Total number	Per cent
Head.....	51	7.0	Pleural cavity.....	17	2.3
Neck.....	11	1.5	Abdominal cavity.....	12	1.6
Trunk.....	76	17.3	External genitalia.....	8	1.1
Upper extremities.....	193	26.5	Miscellaneous.....	73	10.0
Lower extremities.....	288	34.1			

TABLE 4.—*Fractures*

Location	Number	Location	Number
Femur.....	21	Phalanges of hand.....	1
Tibia and fibula.....	7	Metacarpal.....	2
Tibia.....	11	Knee joint.....	2
Humerus.....	17	Elbow.....	3
Ulna.....	8		
Radius.....	2	Total.....	74
Patella.....	1		

TABLE 5.—*Distribution of amputations*

Amputation or removal	Total number	Per cent	Amputation or removal	Total number	Per cent
Thigh.....	17	28.0	Forearm.....	2	3.0
Leg.....	13	21.0	Wrist.....	1	1.5
Knee.....	2	3.0	Hand.....	1	1.5
Ankle.....	3	5.0	Finger.....	3	5.0
Foot.....	3	5.0	Miscellaneous.....	1	1.5
Toes.....	5	9.0	Spleen.....	1	1.5
Arm.....	7	11.0			
Elbow.....	0	0.0	Total.....	59	-----

TABLE 6.—*Regions from which foreign bodies were removed*

Region	Total number	Per cent	Region	Total number	Per cent
Head.....	13	8.4	Abdominal cavity.....	0	-----
Neck.....	5	3.2	External genitalia.....	1	0.6
Trunk.....	23	14.8	Unclassified.....	13	8.7
Upper extremities.....	44	28.6			
Lower extremities.....	55	38.7	Total.....	154	-----
Pleural cavity.....	0	-----			

SKIN TESTS IN ASTHMA

The value of skin tests in certain allergic conditions—asthma, hay fever, vasomotor rhinitis, some types of eczema, and others—is acknowledged by Dr. Richard A. Kern, of Philadelphia, in an article which appeared in the *Atlantic Medical Monthly*, February, 1927, but with reservations.

Kern brings out the fact that skin tests have led to disappointment as guides to treatment of these conditions because of the discrepancies between the reactions and the clinical picture and therapeutic results. He states that experience has taught—

* * * that skin reactivity does not parallel either the intensity or the type of the clinical picture presented by the patient. Skin hypersensitiveness is one manifestation of general hypersensitiveness. Fortunately for us, it usually accompanies hypersensitiveness of other parts of the body, for instance the nasal or bronchial mucosa, but it may be greater or less in degree, or perhaps, wholly absent, or it may be present alone, without clinical manifestations of hypersensitiveness elsewhere. These various combinations give rise to obvious difficulties.

Because the skin reaction does not parallel the intensity of the clinical picture, we can not judge from it the severity of the disease, nor can we always be certain the test is positive. Some individuals give the typical positive reaction; others, with the same clinical condition, give a modified reaction, with a much smaller wheal, little redness, and quick disappearance. These are often overlooked or called questionable. Even with the intracutaneous test, there will still be some that are questionable, when a clinical test of exposure to the substance will show a marked exacerbation of symptoms.

Rarely there is a delayed positive reaction. Kern reports one undoubted example in a patient with angioneurotic edema sensitive to onions. The skin reaction never appeared in less than two or three hours and increased in intensity for as long as 24 hours.

The writer believes that skin hypersensitiveness may be completely absent in the presence of hypersensitiveness elsewhere in the body. He has recently reported four cases of typical hay fever with negative skin reactions.

On the other hand, the intensity of the skin reaction may be so excessive as to be confusing. This is particularly true in persons with dermatographia, in whom any trauma to the skin causes swelling.

Even when there is no clinical evidence of hypersensitiveness to the substances used in making the test, the skin reaction may be positive. Kern explains this by the different ways in which proteins come in contact with the cells and serum in the test and in eating foods.

As to the significance of positive tests with negative clinical findings, Kern says:

* * * In the first place, it is a fundamental rule in the diagnosis of hypersensitiveness that finding a positive skin reaction of itself does not warrant the assumption that the substance so reacting is actually a cause of the patient's symptoms. There must always be clinical proof that exposure to the substance in question will produce symptoms, or that avoidance will bring clinical relief. The second point to be made is that these positive reactions may help us along prophylactic lines. For example, persons who have never had hay fever, but who react to pollens, not infrequently develop the disease in time, following what was apparently an overexposure to pollens (for instance, a long walk through fields on a hot, dry day). In others, we obtain the history that hay fever began immediately after a nasal operation performed during the pollen season. These latter patients were probably pollen sensitive before the operation and would have given positive skin reactions had they been so tested. * * * If these observations are correct, then individuals with positive skin reactions must be considered as potential sufferers from allergic disease * * *.

Young patients react more strongly than older ones. Sometimes the intensity of the reaction varies from day to day. Therefore, slight or doubtful reactions should be repeated.

In conclusion, Kern says:

It is obvious that skin tests have very definite limitations. Far from giving us a true picture of the etiology in a given case, they might be said to show us a much distorted image in an imperfect mirror with many flaws and not a few blind spots * * *. Yet with all their deficiencies, the fact remains that skin tests constitute our most valuable single aid in diagnosis of human hypersensitiveness.

TREPONEMATOSIS

The term "treponematosis" as used by Capt. C. S. Butler and Lieut. E. Peterson, Medical Corps, United States Navy, in a paper entitled "Treponematosis as seen in the rural population of Haiti," and published in *The American Journal of Syphilis*, April, 1927, includes syphilis and "the condition called yaws." These writers believe the two to be identical and in their paper attempt to show this.

As brought out by Butler and Peterson, those who believe that yaws and syphilis are two distinct diseases base their belief very largely upon the frambesioma which, according to them, has no counterpart in syphilis. These authors deny this and say that "the typical lesion of yaws is exactly like the condyloma of syphilis both histologically and in its general appearance." Further, they feel that it is impossible for anyone to obtain a clear clinical picture of yaws—as differentiated from syphilis—from the descriptions given in modern textbooks on tropical medicine.

One reason given as to why yaws and syphilis are considered by many as distinct one from the other is that the subject has not been studied from the historical standpoint. Had it been, it would be difficult to conceive that syphilis is absent from Guam, Samoa, or anywhere else in the world.

The medical profession has a mental picture of syphilis. Because yaws does not conform in all respects to this picture, many say it is a different disease. Butler and Peterson point out that if yaws were not syphilis the frambesioma should be common among our own negro population and should be found in some of the whites of this country who are in close contact with the negro.

Dr. Thomas Sydenham is quoted to show that more than 270 years ago he believed that yaws and syphilis were identical.

Sydenham says:

The lues venerea was introduced into Europe A. D. 1493 from the West Indies, it being, before that time, unknown even by name. Hence the disease is usually considered as endemic to the American colonies. In my mind, however, it is rather referable to the coast of Guinea, or to some portion of the Negro country thereabout. This I think because many of my countrymen have told me that in slave ships, even before they have reached America, the disease breaks out, also that it breaks out with the natives in the country itself, and that independent of any previous unclean intercourse. Indeed, in some cases, it afflicts a whole family—men, women, and children. The disease that thus comes spontaneously is in no respect different from the true venereal lues. The symptoms, the pain, and the ulcers are the same—making allowance for the difference of climate only. The name, however, is different; the African disease is called the yaws.

Sydenham's observations have never been disproved.

A few facts which cause the authors to believe in the unity of syphilis and yaws are:

1. The treponema of so-called yaws was found to be identical with *T. pallidum*.
2. The serum reactions were found to be exactly parallel.
3. The clinical course of yaws is identical with that of syphilis.
4. The specifics of yaws are the same as those of syphilis.
5. The histopathology of the so-called yaws is identical with that of syphilis when the treponema is alone in the lesion in question.

It is not known why native tropical syphilis acts as it does; probably lack of treatment through many generations plays a large part. Environment, type of clothing, or lack of it, also probably have an influence.

The possibility of inoculating syphilis upon yaws, and vice versa, is disputed by the writers. If it were possible, the usual number of venereal syphilitic chancres would be found in "yaws countries." Primary syphilitic lesions are rare in rural Haiti.

Animal experiments have been relied upon to show the duality of yaws and syphilis. Recent ones do not corroborate the earlier results.

Butler and Peterson sent questionnaires to officers of the Public Health Service in Haiti—all men with large experience in the study of treponematoses—and from the answers gathered that all agree that yaws is largely confined to rural districts and small villages; that the frambeside may occur at any age, but is chiefly seen in children; that the venereal chancre is rare; that congenital syphilis occurs in the larger towns; that the most important point in differentiating yaws and syphilis is the history; and that none of those to whom the questionnaire was sent had observed the transition from secondary to tertiary yaws.

The paper closes with these words:

In conclusion we would like to say that we have seen several examples demonstrating the truth of Hutchinson's statement that, in his experience, those Europeans who contracted yaws in the tropics returned home with syphilis.

THE PHYSIOLOGICAL EFFECTS OF TROPICAL CLIMATE

Since the days of Hippocrates much thought has been given to the influence of climate upon the individual and upon the development of racial characteristics. In spite of the vast amount of study which has been given to the subject, many divergent views are still held concerning it. In *Physiological Reviews* for April, 1927, E. S. Sundstroem, under the title above, gives a résumé of the literature, so far as it concerns the influence of tropical climate upon human beings, and states his own conclusions, based upon this literature and personal observation.

According to the writer, the term "climate" is now used in a more restricted sense than it formerly was and implies only " * * * the

atmospheric conditions as constituting the essential agency by which the geographical environment acts on the living organism." Pressure, temperature, humidity, light, and other elements have to be considered. As these are more nearly uniform the year round in the Tropics, tropical climate lends itself more readily to continued study than any other climate.

Acclimatization, individual or racial, is the effect of a tropical climate. At present, knowledge of acclimatization is limited, very largely, to the individual phase. Knowledge of racial acclimatization will have to wait on the completion of such large scale experiments as are now going on in Tropical Australia, or upon the results of animal experimentation carried through many generations.

Acclimatization takes place in three stages: "First, the immediate response; second, the adjustment and stimulation period; third, the attainment of equilibrium."

In recent years more emphasis is being laid upon the biochemical phase and upon animal experimentation.

Humidity and wind affect the comfort of man as much as does temperature. Hence they should be considered in any study of climate. As "cooling power" is largely dependent upon these factors, it is readily seen that even within the Tropics there is a wide range of climate, so far as suitability for human habitation is concerned.

Light conditions in the Tropics require further study. Some writers go so far as to claim "* * *" that the physiological response of an organism to the tropical climate is altogether due to the exposure to light of shorter wave lengths and that the protection offered by the more or less developed skin pigment is directly correlated to the more or less successful acclimatization to a tropical environment. * * * The propounders of the hypothesis have failed to recognize that the physiological effect may be due to other factors as well * * * and regarding white settlers it is a common experience that such individuals who shut themselves up in houses are even more affected than others whose habits bring them frequently out into the open."

Sundstroem considers that only carefully controlled animal experimentation will determine the part played by light in "the supposed deterioration of the white race in the Tropics." It seems possible to him that the stimulating action of the sun's rays, by their heat production, may be deleterious through overburdening the heat dissipating mechanism. As he says. "The trend in newer contributions to tropical physiology seems to be to minimize the action of the 'actinic' light and to focus attention on the existence in tropical regions of a continuous reduction of cooling power, which, more-

over, unlike direct insolation, is omnipresent and requires more elaborate means of counteracting."

If this cooling power plays such a large part, the first step in acclimatization should be an adjustment of the heat regulatory apparatus which would insure a normal body temperature. Data as to elevation of body temperature in the Tropics are conflicting, but the best evidence seems to be on the side of those who believe that such a rise does occur but is slight. Animal experiments show that there may be a slight, sustained elevation in temperature which points to a failure on the part of the heat regulating apparatus to adjust itself.

However, as the author brings out, a slight rise in body temperature may be not harmful, but, rather, beneficial "by increasing the gradient for conductive heat loss." The skin temperature is more useful for determining this than the body temperature. It has been found that there is a definite elevation of skin temperature in the sun, but this falls when perspiration occurs. Eijkman found that Europeans in Java gave off on an average, 16 per cent more heat by evaporation than the natives, and 14 per cent less heat by conduction. However, when he divided the whites into groups in accordance with their body weights, he found that the amount of perspiration decreased at a more rapid rate than the body weight, which suggests that the natives lose a greater proportion of heat by conduction because they are smaller.

It seems possible that the tendency of whites to become thinner in the Tropics is in some measure an attempt to reduce the total skin area and thus reduce the debilitating loss of heat by evaporation and increase the proportionate loss by conduction.

Widely divergent views of the effect of tropical climate on basal metabolism are held. The writer believes that a decrease in metabolic rate takes place. Experiments in which rats were used support this view.

Muscular efficiency of men at work in the Tropics shows no change from that of men at work in cooler climates.

Food consumption shows no diminution from the usual figures.

The blood supply to the skin is greatly increased to insure greater heat loss and maintain the body temperature within normal limits. If the blood volume remained the same there would necessarily be a diminution of the supply to the internal organs. Investigators have shown, however, that soon after arrival in a tropical climate there is an increase in the total blood volume.

The question of "water regulation" in the Tropics, and its importance in bodily welfare is still unsettled. More recent work shows there is no thinning of the blood, such as was formerly considered to take place. On the contrary, there is some evidence of slight concentration.

Because of the increase in loss of water through the skin there is a decrease in urinary output. The consequent high concentration of urine may be injurious to the kidneys, and Young found albumin present in the urine of a large proportion of otherwise normal persons. But, nephritis is generally considered less prevalent in the Tropics than elsewhere. Except for high concentration, urine in the Tropics differs little from that excreted elsewhere.

There seems to be a definite but slight shift to alkalinity of the blood in a tropical climate. This tendency to alkalosis is removed by physical exercise, and it may be because of this that such exercise is beneficial.

Some workers have concluded that life in a tropical climate tends to produce an abnormally high sugar content of the blood and that diabetics should be warned against living in the Tropics. Later work has shown, however, that this is an error and that there is really a reduction in blood sugar.

The author believes that a decrease in blood phosphorus, which occurs in a tropical climate, is one of the most important effects of such a climate.

Although the earlier writers considered that a hot climate was conducive to anemia, later studies have proved that such is not the case, but that there is more likely to be a definite increase in the number of red blood cells. A diminution in the number of white blood cells is quite constant in the Tropics.

No definite conclusion has been reached as to the effect of tropical climate on pulse rate in spite of the large number of observations that have been made. Most of these observations have not been sufficiently controlled to make them of much value.

The effect of tropical climate on blood pressure has been reported to be, first, a lowering, and then an increase to normal or above. This has been denied by various writers, but evidence seem to favor it.

Respiration rate seems to be decreased in the Tropics and the volume increased. The lowered alveolar CO_2 tension points to an increased respiratory volume.

As to the effect of tropical climate on growth, much has been written. Rattray found that young naval cadets increased in height more rapidly than in England but their weight growth was retarded. Animal experiments show that if the cooling power can be raised—as by keeping the air circulating by means of fans—this growth retardation may be partly neutralized.

Although the data are not sufficient to justify definite conclusions, it seems true that white girls in a tropical climate do not menstruate earlier than in a temperate climate. Native girls do menstruate earlier, but there is no proof that this is due entirely to climate.

Animal experiments point to a sterility in males in a hot, humid climate due to inactive sperms.

Growth of hair and nails has been found by the writer to be retarded by 11 per cent in the Tropics. This is probably only an evidence of a lowering of the general anabolic level.

The effect of tropical climate upon the nervous system is of great importance to man, as "tropical neurasthenia" is a not uncommon occurrence among white settlers. Unfortunately the subject has not been studied so thoroughly as it might have been and no definite conclusions as to the cause of this distressing condition have been reached. Various workers have investigated single phases of the subject, but it remains for "group study" to find the real cause of the development of abnormal nervous conditions among tropical dwellers. The writer apparently inclines to the opinion that disturbed endocrine function plays a part.

This review shows the unsettled state of opinion as to the effects of a tropical climate upon those who dwell therein and, while it sheds little light upon the question, points the way to future investigation which may in time be productive of real benefit to the human family by showing what is harmful and what beneficial in such a climate and by arriving at some means of overcoming the deleterious effects.

HISTORY OF MEDICAL PRACTICE IN THE STATE OF ILLINOIS

At the request of the editor of the Illinois Medical Journal, the notice which follows is published. It is believed that the book, "History of Medical Practice in the State of Illinois," will be of great interest to naval medical officers who are natives of the "Illinois country" or who pursued their medical studies in that section.

Doctors who lived formerly in Illinois, or who are descendants of pioneer physicians of the "Illinois country" will hear with interest that volume 1 of the "History of Medical Practice in the State of Illinois" is ready for delivery.

The history has been written under the supervision of a committee appointed by the Illinois State Medical Society as a commemoration of its seventy-fifth anniversary but more especially to make a living tribute to those valiant men of the medical profession who played so able a part in the exploration, settlement, and development of the Illinois country.

In this first volume of the history are set down events from the earliest available knowledge of conditions in the Illinois country, along through the days of the aborigines, and commencing with the actual records when, in 1673, Father Marquette had medical attention in Chicago, up until the year 1850.

In the second volume (now in preparation), narration continues up until the present time. Future years will bring other volumes so that this history will be an ever virile monument to the men and incidents whom it would honor.

Research of years resulted in an opulent supply of material from which to compile this history and has evidenced to an almost unbelievable degree the vital part played by physicians in every angle of the exploration, settlement, and development of a country that is one of the richest and most influential sections of the richest country in the world.

It must be remembered that originally the Illinois country encompassed a territory far greater than the area now known as the State of Illinois. Wisconsin, Indiana, Missouri, Kentucky, and Iowa, as well as what is now Illinois, and even some sections of Ohio fell into that primitive epitome of the Illinois country. In the southern part of the State it was well into the nineteenth century before Missouri and Illinois ever acknowledged the natural divorce of interests made by the Mississippi River. Because of this, naturally enough, close interest in this history extends to physicians or to their descendants in practically every State in the Mississippi Valley or contiguous thereto.

Rare maps, unusual personal memorabilia, and rare discretion in compilation make this history of unique interest to doctors everywhere and to many laymen.

This history of medical practice in the State of Illinois embodies in the course of its narration an interesting and illustrated digest of the early efforts of white settlers in Illinois, with specific allusion to the share in these tasks performed by medical men. Included are portraits of rare interest, reproductions of historic documents, excerpts from diaries, personal letters, human reminiscences of days fraught with peril, filled with hope, and not devoid of humor, through a period of about 250 years. From the days of the "Chirurgeon" who attended Père Marquette, through the massacres at Fort Dearborn, the years of Indian raids, down with the circuit-riding "saddle-bag" doctors, to these days of radium and radio, this history marches. Attics, family albums, safe-deposit vaults, and State records have been ransacked to produce the material needed for this chronicle.

Illinois holds to-day the honor of being the world's medical center. Progressive steps of this achievement and its contributive factors, such as hospitals, asylums, sanitariums, and allied institutions and medical colleges are set forth in detail, both pictorial, documentary, and narrative. In brief, this account epitomizes the almost unequaled growth of a community whose economic wealth is paralleled by its public health. Personal data of the men, of the organizations—including pioneer Army and Navy physicians and surgeons and local, county, and district societies, schools, and hospitals, as well as of the Illinois State Medical Society itself; various internationally famous medical discoveries made by Illinois men; the State's contribution to the world of research; medical libraries and periodicals existent in Illinois; campaigns for medical protection against enemies of public health; details of the various medical practice acts; State sanitation from the notable drainage canal and the supervision of food supplies, vital statistics; meetings, officers, policies, and finances of the State society—all this and more in accurate transcription make this history a miniature encyclopedia of scientific advance and desirable and hitherto unavailable information.

The edition is limited. It will not be reprinted. A place in every physician's library is merited by this volume, both as a tribute to the men who blazed the trail for modern scientific medicine and as an ever-present reminder and authority as to what is happening to medicine right in this State every day, so far as finance, discovery, legislation, and public relations are concerned, and the men who are responsible for the heritage of trust for over two centuries and a half. Volume 1 is now ready. Volume 2 will follow soon. Orders may be sent to Committee on Medical History, Illinois State Medical Society.

Medical and Dental Arts Building, 185 North Wabash Avenue, Chicago, Ill.,
Charles J. Whalen, M. D., chairman.

MERCUROCHROME

The United Fruit Co.'s fifteenth annual report, medical department, 1926, states the conclusions reached by the medical officers of that organization as to the value of mercurochrome, locally and intravenously. The results obtained in the hospitals of the United Fruit Co. closely parallel those reported from our own naval hospitals.

Extracts from the report are given below.

This drug has been used extensively in our hospitals, both locally and intravenously, during the past year. The general consensus of the opinions of our physicians is that it is of great therapeutic value when used locally in from 2 per cent to 4 per cent solution. When applied to fresh wounds, superficial or deep, it prevents suppuration in most cases; in superficial ulceration it greatly promotes healing; in suppurative joints its injection is generally, but not always, followed by excellent results; in suppurative otitis media with perforated drum its action, in the great majority of cases, can be considered as almost specific.

It is of value also in the local treatment of conjunctivitis, pharyngitis, and so on.

In regard to its administration intravenously, a general consideration of the reports made by our physicians who have used it extensively under control conditions leads us to draw the following conclusions:

(1) In the treatment of malaria it is without specific value in freeing the prepheral blood from any of the phases of the development of the three recognized species of the malarial parasite; moreover, in many cases its intravenous administration, even in 10 c. c. to 15 c. c. doses, causes a reaction which retards the convalescence of the patients. In larger doses, followed by more severe reactions, the results are even more unsatisfactory.

(2) In cases of septicæmia and pyelitis, due to any organism, where no other known relief measure is of value, the beneficial and curative results are spectacular in an undetermined number of cases; and the earlier it is administered in the course of the infection the better are the results. Unfortunately, in other apparently similar clinical conditions no benefit is derived from its use. However, in seemingly hopeless cases of infection the intravenous administration of the drug is indicated, and the patient should not be deprived of this hope of relief.

(3) In cases of illness caused by Neisser's organism its intravenous use in simple urethritis is of no specific or curative value, but in epididymitis, arthritis, and other systemic localizations of the organism, if the drug is administered early, the results are generally very satisfactory and sometimes spectacular.

WATER SUPPLIES

Surgeon Rear Admiral A. Gaskell, R. N., who was principal medical officer of the Royal Naval Division in the Gallipoli campaign, published a paper entitled, "Water supplies, with reference to those in the Gallipoli campaign," in the Journal of the Royal

Naval Medical Service for April, 1927. Gaskell's experience was so similar to what might be expected in any campaign of like magnitude undertaken by our own Army and Navy, jointly or separately, and the difficulties which he had to meet and overcome are so likely to arise in any such operation, that it would be well for us to take to heart the advice given in his paper and to profit thereby. His conclusions are:

(1) To ensure cordial cooperation of all officers and men in securing a safe water supply, prolonged and carefully planned education in elementary hygiene is essential, not only to the navy and army, but to the whole population. It has been the fashion lately to decry the importance of educating the public in hygiene. I think the reason for this is that people have been disappointed at the poor results of this education. This disappointment is due to expecting education to bear results too quickly. It takes several generations to educate the public in any matter of importance. Probably the State of Massachusetts has made the greatest efforts in this direction, and apparently there the public are becoming interested and are ready to help the sanitarians. That is what we want in our services and in our population generally. Another cause of disappointment in the results of education is that the educators are often ill-chosen. Only rarely does one find a really efficient teacher. The knack of impressing an audience and making them remember and obey your instructions is a gift which only few possess. Hitherto, instructors have been appointed in a careless manner, and insufficient inquiry has been made as to whether they have the knack of instructing.

(2) It is the duty of the intelligence department of our war office to collect and sort information which will be useful in war. Apparently not much information is collected on matters of water supply. It ought surely to be possible eventually to obtain geological charts, large scale ordnance survey maps, etc., of every country in the world, so that if ever hostile operations had to be carried out in any given part of the world, the Army sanitary authorities would be able to plan out many alternative schemes for water supply in the war area. Specially appointed experts should be in charge of this work so that sound advice can be given to the army. Such information before the landing in Gallipoli would have been of the greatest service, and would have prevented much sickness.

(3) With the experiences of this war so fresh in our minds, there ought to be an incentive for a thorough scientific research in the matter of water supply in the field, so that possibly some new ideas may be evolved on the subject. We are a little apt to follow slavishly our previous methods and not to realize that possibly a perfectly new departure may be found if only we search for it. No one method can suit all circumstances. The governing factors which will decide which method or methods are to be used are: (a) Position of water supply; (b) nature of water supply; (c) purity of water supply; (d) amount to be supplied; (e) permanent, semipermanent, or temporary supply required; (f) apparatus available; (g) time available for the process; (h) good organization and well-trained water-duty personnel; (i) character of consumer, e. g., well-disciplined or not, well-inoculated or not, fastidious or not. If experiments can arrive at anything like finality in this matter, it seems highly desirable that the methods of water purification in war should be frequently used in peace so as to educate our men in the technique.

(4) Any schemes drawn up for military undertakings must not only anticipate success but also failure and perhaps repeated failures. In Gallipoli the Mark V

water cart did not meet all requirements, and the fact that it was the only means supplied for purifying the water gave us no alternatives. Failure had not been anticipated.

(5) The water supply of an army in the field is of prime military importance, and instruction should be given to cadets and soldiers at the very beginning of their training, at Sandhurst, Woolwich, and elsewhere.

SEASICKNESS

Because of their seagoing experience, naval medical officers are usually considered to be experts in the treatment of seasickness. As a matter of fact, they see very few cases, because the average officer and enlisted man, if he should have symptoms, considers that it is beneath the dignity of his profession to indicate or speak of it in any way. It is, therefore, to the medical officers of passenger steamships or to transport surgeons that we must look for the greatest knowledge of this condition.

A number of years ago, at an international medical congress, the writer had an opportunity to listen to the reports of the secretaries of many countries in the league against seasickness as to the sure cures advocated. It was amusing to learn that practically every thing in the Pharmacopoeia had been tried and that the most reliable method was dulling the sensibilities by means of bromide and other sedatives.

It was not until a medical officer (of the Army, incidentally, rather than the Navy), Brig. Gen. Alfred C. Girard, in a report presented to the International Medical Congress at Lisbon, 1906, advocated a treatment which apparently was specific in action. He thought at this time that he was the original discoverer, but later learned that other physicians had used it. This treatment consisted of a hypodermic injection of one one-hundred-and-twentieth of a grain of atropine sulphate with one-sixtieth of a grain of strychnine sulphate for adults. This was usually given at the commencement of a voyage, when the sea commenced to be rough, or when symptoms of seasickness appeared. In certain cases it had to be repeated twice at hourly intervals before there were symptoms of atropinism, at which time all of the symptoms of seasickness disappeared. The advantages of hypodermic medication are the rapidity of effect and the absence of accumulating action and the possibility of rejection by vomiting. As a rule, one dose is sufficient for a whole voyage, as the traveler acquires his "sea legs," but on long trips occasional doses might be required. The rationale of this treatment is in accord with our theory of seasickness, the atropine acting on the circulation to overcome the vasomotor disturbances and the strychnine stimulating the nervous system, which is disturbed from the semivascular canals.

In the Journal of the American Medical Association of June 23, 1906, Doctor Girard reported in detail his experience with this treatment while a transport surgeon.

The necessity for the hypodermic use of atropine rather than its use by mouth was commented on, by Doctor Bassé, of the French Navy, in the UNITED STATES NAVAL MEDICAL BULLETIN for January, 1923.

Perhaps one of the most complete and interesting articles on seasickness and car (train) sickness is that in Billings' Forcheimer's Therapeutics, by Capt. C. S. Butler, of the Navy. He not only discusses the theory of seasickness in detail but he emphasizes the utter futility of drugging the vast majority of those who are being treated by bromides and sedatives. In fact, he attributes, as a result of such treatment, the conditions sometimes seen in severe cases, when artificial heart block has occurred, caused not by the seasickness but from the treatment. Captain Butler believes that a "clear head, a clear gastrointestinal tract, and a few words of encouragement and advice are the items the prospective passengers should get from the physician. Moderation in all things as a habit in life, but, if not that, then at least for a week before sailing, will accomplish the first item." For the second item he advises the pill containing aloin one-fifth gram (13 milligrams); extract of belladonna, one-eighth gram (8 milligrams); strychnine, the pure alkaloid, one-twentieth gram (3 milligrams); and ipecac, one-sixth gram (11 milligrams) in each pill.

In the November, 1925, number of the UNITED STATES NAVAL MEDICAL BULLETIN there was an abstract from the thirteenth annual report of the United Fruit Co. for the year 1924 of an article on seasickness by Dr. P. H. Desnoes, in which he mentions the hypodermic use of the drugs of the belladonna group combined with strychnine, but believes that he has secured better results with hyoscine hydrobromide, one four-hundredths of a grain by mouth every hour until the patient is relieved or until physiological effects are obtained. In cases with much depression one-sixtieth of a grain of strychnine sulphate was added to this, and for severer cases with much vomiting the medication was given hypodermatically.

Although the number of cases that come under observation in the Navy are limited, it is believed from personal experience with Doctor Girard's treatment that it is not sufficiently known nor used as often as results warrant.

CHOLERA IN SHANGHAI IN 1926

In the Journal of the Royal Army Medical Corps for May, 1927, Capt. R. C. Robertson, late Royal Army Medical Corps, and Lieut.

C. C. P. Anning, Royal Army Medical Corps, discuss the epidemic of cholera which occurred in Shanghai during the summer of 1926, with special reference to treatment.

Because of the excellent water supply of the International and French Concessions and the care usually exercised by foreigners regarding food and drink, these writers do not consider cholera a serious menace to the foreign inhabitants of Shanghai, even in the presence of an epidemic among the natives.

During the epidemic of 1926 there were 3,140 Chinese cases notified. Of these 1,165 occurred within the international settlement; among them were 53 confirmed cases among the foreign inhabitants, most of those affected being indigent Russian refugees.

Sanitary inspectors visited the homes of all patients within the international settlement and, as a result of their study, determined the source of infection to be as follows:

A. Contact with a previous case.....	20
B. Water—contaminated.....	84
Native ice.....	122
C. Food—contaminated, process unknown.....	145
Food—contaminated, fly infection.....	118
Food—contaminated, infection from excreta.....	4
Melon—contaminated.....	236
Other fruits—contaminated.....	42
D. Source of infection untraced.....	394
Total	1,165

Cholera was epidemic in the Provinces surrounding Shanghai, and infection was probably brought in from these.

While, as has been said, the water supply of the International and French Concessions was excellent, that of the Chinese sections was not sanitary. The Chapei waterworks were not properly repaired and cholera vibrio were found in its water in July. When this plant had been thoroughly cleansed and disinfected, the number of cases immediately decreased.

The melons were probably contaminated while exposed for sale in slices, it being the custom of native dealers to keep the melon fresh by sprinkling with dirty water from melted ice.

The first case of cholera was reported in May. During July there were 1,417 Chinese cases reported, probably not half the total number. The last notification was received on November 3, making a total of 3,140 Chinese and 76 foreign cases.

The Chinese cases received treatment in hospitals within the settlement. All the foreign cases were treated in the Municipal Foreign Isolation Hospital, but only about 10 per cent of the native patients were treated in the Municipal Chinese Isolation Hospital because of lack of accommodations.

All cases were diagnosed clinically and bacteriologically, but emergency treatment was instituted as soon as the patient arrived at the hospital.

During the epidemic 359 Chinese were received at the Chinese Isolation Hospital. It was found that 38 of these did not have cholera, so the statistics as to treatment are based upon 321 proved cases. Forty deaths occurred, making the mortality 12.45 per cent.

Upon admission to the hospital the patients were classified as to the severity of the symptoms, according to the degree of collapse, the state of the pulse, the blood pressure, the frequency of defecation, and the type of stool. Of 61 very severe cases, 29 died; while of 60 moderate cases, none died. The very young and the aged had the highest death rates.

The treatment used was as follows:

A hot bath was given on admission if the condition were not too severe. Temperature, pulse, and blood pressure were recorded. A hypodermic injection of atropine, $\frac{1}{160}$ grain, was given, followed by an intravenous transfusion with Rogers's hypertonic saline (sodium chloride, 120 grains; calcium chloride, 4 grains; potassium chloride, 6 grains; water, 1 pint) at body temperature. Two to fourteen pints were given, transfusion being stopped when the blood pressure remained above 100 millimeters Hg and the pulse was firm.

Whenever the blood pressure fell below 100 or the pulse showed signs of failing, the patient was again transfused.

Potassium permanganate solution (1 to 4 grains to a pint of water) was given to all patients for drinking purposes. Patients were required to sip the solution frequently until the stools began to form.

If albumin or acetone appeared in the urine, a 2 per cent solution of sodium bicarbonate was given. If symptoms of acidosis became evident, transfusion of an alkali solution (sodium chloride, 1.5 per cent; sodium bicarbonate, 4 per cent) with three pints of Rogers's solution was performed.

Morphine was used in cases where the abdominal and limb pain was severe. Bismuth was given to patients with frequent vomiting.

As has been stated, 40 patients died. Eleven of these deaths were due to uremia and acidosis and five to peritonitis. Five of the patients who died were pregnant. In four cases respiratory disease complicated the condition, and in one case pyemia.

The patients who died of peritonitis had all been "needled" by native "doctors."

More than one-third of the deaths occurred before the patients had been in the hospital 12 hours and most of these were moribund on admission.

Among the foreign cases infection from contaminated food was found to be the most frequent source.

The death rate among foreigners was 17.02 per cent, probably because of the undernourished condition of those attacked.

The authors, from their careful study of this epidemic, reached the conclusions—

(1) That, with adequate hygienic precautions, cholera should not affect the foreign population of Shanghai.

(2) That, when cases reach hospital in the early stages, cholera is no longer a very fatal disease.

(3) Uremia and clinical acidosis were the most serious complications noted in this series of cases.

FRACTURES OF THE SKULL

A knowledge of the fatal complications likely to follow fracture of the skull is the first essential step toward finding a means of preventing them. For this reason a paper on this subject by B. M. Vance, M. D., assistant medical examiner, city of New York, which was published in Archives of Surgery for May, 1927, is of especial value.

In his work as a medical examiner in New York the author performs autopsies upon many persons who die as the result of accident or assault, and has access to the records of other examiners connected with his office. Therefore his figures are large enough to carry weight.

The paper should be read in its entirety by all surgeons. Only a brief summary of its most important details will be given here, the author's summary being made use of for this purpose.

Vance made a study of 512 cases of fracture of the skull which came to autopsy. The types of fracture encountered were classified as follows:

A. Fractures of the vault and base.

(1) Posterior fractures.

(a) Fissure fractures.

(b) Composite fractures.

(2) Lateral fractures.

(a) Fissure fractures.

(b) Composite fractures.

(3) Anterior fractures.

(a) Fissure fractures.

(b) Composite fractures.

B. Fractures of the vault.

(1) Fissure fractures.

(2) Composite fractures.

(3) Depressed fractures.

In 139 cases death was caused by cerebral concussion. The majority of these died within 1 hour of the injury and all within 10 hours.

Exhaustion was the cause of death in 14 cases. These died after periods varying from 1 to 20 days.

Terminal lobar pneumonia, which set in from 2 to 9 days after injury, caused death in 27 cases.

Cerebral compression, due to subdural hemorrhage and severe laceration of the brain, was the cause of death in 156 instances, while 61 patients died as a result of compression from epidural hemorrhage. Most of the hemorrhages were caused by laceration of the middle meningeal artery by the fractured bone. Most of the deaths from cerebral compression occurred within 24 hours after the injury, but some took place much later (8 to 14 days).

Acute suppurative leptomeningitis was responsible for 41 deaths. Seven deaths were due to other septic infections. These patients lived for from several days to several weeks.

Four deaths were the result of operative procedures. One of these was due to ether, two to postoperative shock, and one to hemorrhage from the superior longitudinal sinus.

Traumatic epilepsy accounted for three deaths. Adhesions between the brain and dura occurred and death resulted in from one and one-half to two years after the injury.

There were 30 deaths from injury to other parts of the body which took place at the same time as the skull fracture.

In 25 cases there was no connection between the trauma and death.

Of the 512 patients, 5 were infants under 5 months. In these cases death was usually the result of concussion or exhaustion, although one baby developed a subdural hemorrhage.

The clinical records of 61 cases from the first surgical division of Bellevue Hospital are given in detail by the writer. These were fatal cases of fracture and cases of patients who recovered, some after craniotomy and some after expectant treatment. Of these, 34 were operated upon, 23 of whom died. Twenty-seven patients recovered under expectant treatment.

In the 34 patients operated upon three indications for operation were found. These were compound or depressed fracture of the skull, definite intracranial tension, and disabling paralysis on one side.

The 27 patients who recovered under expectant treatment were over the acute effects of the injury in from 20 to 24 days after the trauma was received. Most of these showed no severe after effects. Six were permanently deaf on one side, and one man showed a disturbance of the sense of smell.

Of the 11 patients who recovered after operation, some were without after effects; 1 developed a low-grade psychosis; 4 showed motor disabilities which improved but did not disappear entirely.

SENESCENCE AND SENILITY

The Cavendish lecture before the West London Medico-Chirurgical Society, delivered by Leonard Williams, M. D., Glasgow, was published in *The Lancet*, June 4, 1927, in an abridged form under the title above. It contains many novel ideas, presented in an interesting style, and, but for its length, would be reprinted in its entirety. Below will be found a résumé of its most important paragraphs and quotations which express the lecturer's views in his own language.

The first point brought out by the speaker was that while "the circulatory system contains the physiological secrets of nature" too much attention has been paid to the corpuscular elements and too little to the plasma ingredients. It is these latter which, in his opinion, determine in a large measure the onset of senescence and senility.

The plasma contains foodstuffs, including vitamins, "for the nourishment of the tissues, to repair waste, to supply fuel, to liberate energy." Most of these foodstuffs are acted upon by the liver before they enter the blood stream, but some escape this cleansing process and gain direct access to the blood through the thoracic duct. It is the impurities which get in in this way that do most of the damage.

Not only does the blood plasma receive ingredients from the gastrointestinal tract, but also from the endocrine system. These are most important, for, as the lecturer says, " * * * at any given moment a man may be said to be the resultant of his hormones."

Another function of the plasma, we are told, is depuration. If unsuitable material be taken in, the energy required for its removal will lead to exhaustion and early senescence. Much of this is attributed by Williams to gluttony and bad cooking. Cooking, as generally practiced, he terms "merely a bad habit." The eating of uncooked salads, dairy produce, and fruits, rather than these same foods after they have been subjected to baking, boiling, frying, stewing, etc., by some incompetent cook is strongly advised. Of our food habits, he says:

"*Homo sapiens* may be wise and watchful in some matters, and clever and cunning in others; in the matter of his food he is nothing more than an ignorant and obstinate simpleton."

The impurities of the plasma influence the various systems of the body in the order of their complexity, the nervous system being the first to suffer. It is here that the first signs of degeneration are observed. Nervous control and intellectuality show the earliest decay. Further, the lecturer says:

When youth loses its fire, maturity its illusions, and middle age its ambitions, it is surely a sign that the brain cells are being bathed by a liquor sanguinis which is already bereft of its pristine vigor; and the earlier in life the back-

sliding occurs the more certainly does it point to an active intoxication of the plasma, to a filling up of the cup with cumulative culture bouillons.

The genus homo inherits from his simian ancestors a certain playful devilry of spirit, indicated in youth by a sense of bolsterous humor. When this gives place to a square-toed pomposity of attitude * * * It means that the plasma has been deprived of its erstwhile purity and the descent has begun * * * It is not the external gestures of youth that the senescent should seek to retain, but the spirit of adventure and the chase * * * Smug-faced satisfaction is the one great and unforgivable sin.

Next the lecturer urged the necessity for a certain amount of fasting. He considers it inadvisable to burden the bodily economy with foreign products, unwanted and not needed, in the form of food, when its whole energy is occupied in fighting infection, neutralizing a toxin, or correcting a metabolic disturbance. All the food needed may be obtained from the tissues, in which nature has stored it in an easily assimilable form. As he says, "In comparison with the ordinary British invalid, the forcibly-fed Strasbourg goose is an ascetic * * * Fasting is the simplest and safest of all remedial measures. It is nature's way."

Of artificial rejuvenation, the lecturer says that the Voronoff operations does not prolong life but does prolong efficiency. However, he believes the operation should never be necessary. By being careful to keep the liquor sanguinis pure, the necessity for grafting will be avoided.

The best measure of rejuvenation is a thoroughly depurated blood supply, and the best means for securing that is to practise moderation punctuated by fasting. It is better to find salvation in a dietetically sober and righteous life than to seek to conjure back competence by a cutting operation.

In spite of all, however, senility in some form awaits us all. Gradual decline must come as a result of dilution of the blood plasma and through endocrine disturbance.

Among the qualities which come with old age in those who have lived wisely, according to the lecturer, are judgment, insight, tolerance, and equanimity. These should be cultivated when other signs of senescence warn us that we are approaching our end. Then old age will have no terrors.

BISMUTH IN THE TREATMENT OF SYPHILIS

Venereal Disease Information, issued by the United States Public Health Service, contains, in its issue for April 20, 1927, an abstract of an article by Thomas Anwyl-Davies, which appeared originally in the Lancet. It is a review of the use of bismuth in the treatment of syphilis and a report of its use by the author at St. Thomas's Hospital, London.

The conclusions reached are as follows:

1. Bismuth and its compounds have a definite use in the treatment of syphilis.
2. The soluble compounds are painful and more toxic than the insoluble drugs, which are painless.
3. Metallic bismuth is the least toxic of these preparations.
4. The most satisfactory method of administration is by the deep subcutaneous route.
5. Severe bismuth poisoning may occur in spite of the absence of the blue line on the gums.
6. Bismuth is capable of eliciting the Jarisch-Herxheimer reaction.
7. Tertiary lesions of the mouth and tongue, and the symptoms of tabes, respond particularly well to bismuth therapy.
8. Bismuth may not be so powerful as mercury, but it is more convenient to use.
9. Bismuth and arsenobenzol have not such a strong effect on the Wassermann reaction as arsenobenzol and mercury.
10. Bismuth is valuable in cases of nephritis, jaundice, and advanced organic disease, where mercury and arsenic may not be suitable, and in late syphilitic cases which have become resistant to arsenic and mercury.
11. The evidence is in favor of bismuth, arsenic, and mercury, all being capable of producing resistant spirochetes when administered in subtherapeutic doses.
12. Bismuth is not an efficient substitute for arsenobenzol.
13. Recent experiments by Kolle and Evers suggest that bismuth may have an inhibitory action rather than a curative effect, and at present our knowledge does not warrant the wholesale adoption of bismuth instead of mercury.
14. It is not established that bismuth is more effective than mercury in the permanent cure of syphilis, and it may be found that the curative value of mercury is higher than that of bismuth.

PRESSURE METHOD OF VACCINATION

The pressure method of vaccination against smallpox, suggested by Surgeon J. P. Leake, United States Public Health Service, and described by him in the April, 1927, number of the *BULLETIN*, has been adopted as the method of choice in many institutions and by many individual physicians, because of its simplicity and its time saving feature, and because the necessity for any dressing is done away with.

Among the more recent papers dealing with this method is one by Stanley Thomas, M. S., and R. C. Bull, M. D., of Lehigh University, who have adopted the method for use in vaccinating the students of that institution. The paper was published in the *Journal of the American Medical Association*, June 11, 1927. Only the conclusions will be given here.

1. Of the methods employed by us for the vaccination against smallpox the pressure technic has been shown to be as efficacious as any other in inducing vaccinia in susceptible persons.
2. The pressure technic has the advantage of saving time in vaccinating a large number of persons in a short time.
3. The pressure technic overcomes the objection to the use of a dressing following vaccination and makes the dressing or shield obviously unnecessary.
4. The pressure method is more desirable from the point of view of the vaccinated person.

From these results it is our intention to adopt the pressure technic as the sole method of compulsory vaccination at Lehigh University. At the opening of college next September it will be necessary to vaccinate about 500 students. The time allowed in the schedule for this work is two hours. With sufficient clerks to make the records, two operators will easily accomplish this, using the pressure technic.

VENTILATORS

Ventilators, which add so much to the comfort of life on board ship, and without which we could hardly exist, were not developed in any navy and, strange to say, were received without enthusiasm in the British Navy—even with reluctance.

In *The Lancet*, June 18, 1927,* A. E. Clark-Kennedy, M. D., M. R. C. P., writes entertainingly of Stephen Hales, D. D., F. R. S., a man who, while not a medical man but, rather, a biologist, seems to have delved deeply into the sciences allied with medicine and to have produced worthwhile results.

Among the valuable contributions made by Hales to the health and comfort of his fellowmen, none is more deserving of praise than the development of ventilators for use on board ship and elsewhere. Apropos of this, the writer says:

In 1740 troops lay embarked off Spithead for an expedition to America. Hales suddenly conceived the notion that large ventilators would be very serviceable in making the air in ships more wholesome. These ventilators were to take the form of large bellows to be worked by hand, which would suck out the foul air from between decks. But he was not alone in this idea. A few months later, Martin Triewald, captain of mechanics and military architect to the King of Sweden, devised a similar machine, which was fitted on board the men-of-war that were sent to blockade St. Petersburg. As Hales remarked—

"It were indeed a very extraordinary circumstance, that two persons at so great a distance from each other, without getting a hint of it, one from the other, should happen to hit on inventing a like very useful engine."

But it was even more remarkable than this, because at the same time, Sutton, a coffee-house keeper in Aldersgate Street, contrived a method of drawing off the bad air on board ship by means of the cookhouse fire. Sutton's invention remained in obscurity, but Hales's ventilator at once attracted the attention of the admiralty.

"Doctor Lee having heard of them, he first," writes Hales, "and then the rest of the right honourable the lords commissioners of the admiralty, were pleased to send for me, to be further informed about them; and thereupon were pleased to order the master shipwrights, and other officers of Woolwich and Deptford yards to consider the most commodious place where to fix them on a ship."

Accordingly, they were fitted on board *H. M. S. Captain*, a 70-gun man-of-war. His ventilators, however, were received with "coolness by some, and contempt by others;" it was probably too much trouble to work them. But if they did not find favor at first in the Royal

Navy, they met with great success in convict ships and the vessels of the slave trade. The mortality on slave ships was appalling; many are said to have lost up to 50 per cent of their slaves during voyages across the Atlantic, a death rate which the installation of ventilators did much to reduce. Five Nova Scotia ships were equipped with them by the Earl of Halifax. Only one slave died in the ventilated ships for every 12 in those unventilated. In a letter to Hales, Captain Thomson wrote as follows:

We found this good effect from ventilation, that though there were near 200 men on board, for almost a year, yet I landed them all well in Georgia notwithstanding they were pressed men, and delivered me out of gaols with distempers upon them. This is what I believe but few transports, or any other ships, can brag of; nor did I ever meet the good luck before; which, next to Providence, I impute to the benefit received by ventilators.

Doctor Demambray wrote:

Ventilators were put into the vessels in the slave trade, at Bordeaux, and in other ports of France; the happy effect of which was, that instead of the loss of one-fourth of those valuable cargoes, in long passages from Africa to the French plantations, the loss seldom exceeded a twentieth. And since my return to England I have been informed of a French vessel which by this self-evidently reasonable precaution, saved 308 out of 312 slaves, spite of most tedious calms, and a long passage.

Thus Hales did much to mitigate some of the horrors of the slave trade, but it is an interesting illustration of the mentality of his generation in respect of social reform, that, when preaching before the trustees of the Colony of Georgia, he confidently justified slavery as being in accordance with the teaching of Christianity.

In 1750 a tragedy had occurred during the trial of malefactors at the sessions house in the Old Bailey. The lord mayor, two judges, and a total of 60 persons had died of the gaol distemper, communicated to them by the felons from Newgate. The aldermen of the city of London, naturally seriously alarmed, consulted Hales, and decided to install ventilators in Newgate to be worked by a windmill erected on the "leads." During the construction of the ventilator the youngest of the journeymen on the work was forced to go down into the main shaft of the ventilator by his fellows to bring up a wig one of them had thrown down. As the windmill was working at the time, he nearly "died of the stink," it is said, before they could get him up. That night this young man contracted typhus, and 7 out of Mr. Stibbs's 11 workmen were stricken with the same disease. When at last the system was complete Hales made a tour of inspection of Newgate, and rejoiced to see the ventilators "drawing like large heavy lungs at the rate of 7,000 tons of foul air per hour out of the different wards of the prison."

* * * Hales's ventilators were also installed in the gaols at Northampton, Shrewsbury, Winchester, Maidstone, Bedford, and Aylesbury; in the London smallpox hospitals, and at St. George's; also in hospitals at Durham, Winchester, and Bristol, and even at Naples. Later they were introduced into the naval and military hospitals and prisons at Gosport, Portsmouth, and Plymouth. So eventually even the Navy was convinced.

* * * Wherever Hales's ventilators were installed the air in the wards is said to have been rendered much purer, and the mortality among the inmates from the gaol distemper considerably reduced. But typhus is due to the bites of infected lice, and not to foul air, as Hales supposed. No amount of ventilation, however perfect, could have abolished the gaol distemper. Hales's bellows ventilator has gone. Hospitals and prisons are so built in these days that mechanical ventilation is seldom necessary. But his principle of the forcible propulsion of air still persists, and adequate ventilation remains one of the first principles of preventive medicine. Hales must therefore stand for all time not only a great biologist, but one of the pioneers in public health.

NEUROSYPHILIS

Venereal Disease Information, May 20, 1927, contains a paper on this subject by J. L. Birley, M. D., the conclusions of which are quoted in full.

1. The introduction of salvarsan and its allied compounds in the treatment of syphilis, other than in the Wassermann negative primary stage, has not succeeded in protecting the human nervous system from syphilis; on the other hand, there is no evidence that it has increased neurosyphilis.

2. The influence of arsenical compounds in modifying the incidence, time of onset, and character of neurosyphilis remains to be determined.

3. The pathological changes which occur in the nervous system, including its coverings, and in the cerebrospinal fluid from the time of infection up to the development of late parenchymatous neurosyphilis, and the mutual relations which exist between these changes, are still largely a matter of conjecture.

4. The value of antisiphilitic treatment in arresting the progress of tabes and allied conditions is difficult to estimate owing to their liability to undergo a spontaneous arrest.

5. The Wassermann reaction is not biologically specific, and its value as a guide to an indication for treatment can not, therefore, be regarded as absolute.

6. The nonspecific treatment of general paralysis has, according to the published figures, achieved better results than any previous method.

7. A majority of the unsolved problems of syphilis are intimately bound up with the increasing immunity to syphilis of the civilized peoples, together with the lack of any methods by which this immunity can be estimated.

TENNIS LEG

It is not uncommon for tennis players, of whom there are many in the Navy, to experience a sudden sharp pain in the calf of the leg, followed immediately by almost complete inability to walk. Usually the person who suffers this injury thinks he has been struck by a ball, served or thrown by some one behind him. What really has happened is a rupture of the fibers of one of the calf muscles, due to some sudden strain thrown upon them, as by a quick turn or an abrupt halt when running.

So frequent is the injury among tennis players that it is commonly known as "tennis injury" or "tennis leg."

Frederick Christopher, M. D., F. A. C. S., in the June 1, 1927, number of the Medical Journal and Record, gives a brief analysis of the injury and advocates a treatment diametrically opposed to that usually employed.

It is usually believed that the plantaris is the muscle involved in this injury, but Binnie thinks it more probable that some of the fibers of the gastrocnemius are involved.

Treatment of the injury has in the past consisted of rest to the part, frequently accomplished by splinting. Recovery in these cases has been slow, one case reported by Kottner requiring 19 months.

Christopher states that it has been noticed that recovery took place more quickly in those patients who disobeyed instructions and exercised at any early date. He is of the opinion, also held by some others, that prolonged rest is harmful, because it leads to painful adhesions or a cicatricial contraction of the fibers, and that the best treatment is to have the patient begin walking at once, if the pain is not too severe. In cases where the pain is too severe to allow this, strapping with adhesive plaster or wearing an elastic bandage is advocated. In some cases a few days of rest and external heat will be advisable, but the leg should be used as soon as possible. Violent exercise must be avoided for three or four weeks. The prognosis is excellent.

The writer reports three cases treated by the method described with excellent results.

TEA IN TREATMENT OF BURNS

The tannic acid treatment for burns has become widespread and bids fair to replace, to a large extent, the older treatment with picric acid, paraffin, and so forth.

In the Journal of the American Medical Association, of June 11, 1927, is an abstract of an article by J. K. Shen, the original of which was published in the China Medical Journal, February, 1927. The abstract is quoted in full:

Tannic acid has been used in the treatment of burns rather extensively in Shen's clinic, and its efficacy has been amply demonstrated. It occurred to him, however, that as the principal active ingredient of tea is tannic acid, it might be possible also to use strong infusions of tea for the treatment of burns. It further occurred to him that as tea is the beverage in China, as well as in the other oriental countries, a common therapeutic measure for burns might be developed which can be readily used in any household. The 15-minute, 8 per cent infusion of average green or red (black) tea is considered as most suitable for the treatment of burns. The infusion can be sterilized by boiling for three minutes. Good results are reported.

EUROPEAN INFLUENZA EPIDEMIC AT END

The following figures on the influenza epidemic of 1926-27 are contained in the May issue of the monthly epidemiological report of the health section of the League of Nations:

The influenza epidemic came to an end somewhere in March or April. An evaluation of the number of deaths which it has caused from provisional returns mostly covering only urban districts must be uncertain owing to the differing degree of efficiency of the medical certification of causes of death in general, and in particular owing to different systems of tabulating deaths from complications. It is probable, however, that the figures shown below for towns of the United Kingdom, Scandinavia, Germany, the Netherlands, and Switzerland are fairly comparable. Most complete are probably the Swiss data, in which case contributory causes of death are very carefully stated and tabulated.

The average death rate from influenza per 100,000 inhabitants in German towns, 20.7, and that in Dutch towns, 21.9, are very similar. The influenza death rate has been higher in English towns, 38.3, where also the general death rate was higher than in German towns. Still higher rates are encountered in the western part of Switzerland. The figures for Paris and certain other towns should be much increased by the inclusion of deaths attributed to bronco-pneumonia, pulmonary congestion, heart disease, etc., due to influenza.

Towns in the same country frequently show very considerable differences in their influenza mortality; excluding smaller towns, where the figures are more influenced by chance, they differ as widely as from 8.5 at Glasgow to 63.8 per 100,000 at Nottingham, and from 12.8 at Hamburg to 30.5 at Breslau. The western part of Switzerland has suffered at least twice as much as the remainder of the country, and the town of Geneva has suffered most.

Although the total mortality caused by the epidemic in Europe can not as yet be definitely given, it would appear from the available statistics to have been probably not less than 100,000, possibly more.

These mortality data for large towns give some idea of the extension of the epidemic but are not always truly representative for countries as a whole. Urban and rural districts frequently react differently to an epidemic, and that has been the case with this epidemic in the Netherlands, which is the only country for which current statistics are available according to size of municipalities. In the Netherlands the recent influenza epidemic caused relatively more than twice as many deaths in the rural districts as in towns of more than 100,000 inhabitants. This relation was less pronounced in 1925 and 1926, while in 1923 and 1924 the influenza mortality was lowest in medium-sized towns. Since the causes of deaths are tabulated only in the central statistical bureau, and the accuracy of certification can not have become impaired in the towns, it is obvious that this change corresponds to an actual change in the occurrence of the disease, or rather in the resistance of the inhabitants in towns and in country.

Certain other differences between urban and rural influenza mortality exist in the Netherlands. In towns of over 20,000 inhabitants, 59 per cent of the deaths were among women during the recent epidemic, while in the rural districts the number of male and female deaths was equal. Municipalities with between 5,000 and 20,000 inhabitants held an intermediate position, 52 per cent of deaths being among women. It is true that the proportion of women is higher in towns than in rural districts, but the difference (3 per cent) is smaller than for the influenza deaths. It will be recalled that the influenza

mortality was considerably higher among females than among males in Swiss towns and in Paris. In the Dutch towns of more than 20,000 inhabitants, 17.3 per cent of deaths from influenza were among persons of less than 30 years of age, while the corresponding figures for smaller towns and rural districts was 20.5 per cent.

VISIT OF THE RELIEF TO WASHINGTON

The presence of the hospital ship *Relief* in Washington during the recent meeting of the American Medical Association excited a lively interest among the doctors in attendance upon the convention.

Although the stay of the ship in Washington was of brief duration, 1,071 doctors and 1,119 nurses registered on board, and it is estimated that on the last day of the ship's visit 7,500 persons availed themselves of the opportunity to inspect this modern floating hospital.

Practically every State in the Union was represented by the visitors, as well as several European countries, Cuba, India, and the Philippine Islands.

Without exception the visitors were high in their praise of the equipment of the *Relief* and expressed surprise that so complete a hospital could be contained within the hull of a ship.

The name and fame of the *Relief* will undoubtedly be widespread as a result of this visit, and the Medical Department of the Navy will benefit thereby.

AVIATION INSTRUCTION FOR HOSPITAL CORPS MEN

Since naval aviation is expanding at a rate such as to preclude the bureau's accomplishing training of all men prior to detail to aviation activities, it will be necessary for each aviation unit to institute special training of the personnel attached, both for employment on such station, and for subsequent detail.

This training should comprise both theoretical and practical instruction in the conduct of examinations, in rebreather technique, in all clerical forms and procedures, and in first aid peculiar to the naval air service. Training should be started as quickly as possible after men report for duty, and should be continued as rapidly as is consistent with the efficiency of the local administration of the Medical Department.

The Naval Medical School, Washington, D. C., is now giving instruction in aviation procedures to a limited number of men who are recommended for the course by their medical officers. All applications for this special class are placed on an eligible list from which men are selected for the course. The period of instruction is from two to three months. On completion of the course men ordered to the Naval Medical School for this class will be returned to the ship or station from which they were ordered.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,

UNITED STATES NAVAL MEDICAL BULLETIN,

Bureau of Medicine and Surgery, Navy Department,

Washington, D. C.

(For review.)

BASAL METABOLISM IN HEALTH AND DISEASE, by *Eugene F. DuBois, M. D.*, *Medical Director, Russell Sage Institute of Pathology; Associate Professor of Medicine, Cornell University Medical College, New York; Captain, Medical Corps, U. S. Naval Reserve.* Second edition, thoroughly revised. Lea & Febiger, Philadelphia, 1927.

To the person who is interested in the clinical application of basal metabolism rather than the physiology of the subject this new edition of a standard work will be of far greater interest than the first. The work has been thoroughly revised and certain chapters have been rewritten and rearranged. Naturally enough a great deal of space is devoted to the physiology, the physics, and the theories concerning basal metabolism and its determination. The interest of the physician, however, will center on the well-written and very readable section on metabolism in disease. The chapters on basal metabolism in diabetes, diseases of the thyroid, and basal metabolism in diseases of the blood will be especially appreciated by the average medical officer.

TEXT-BOOK OF BACTERIOLOGY, by *William W. Ford, M. D.*, *Professor of Bacteriology, School of Hygiene and Public Health; Lecturer on Hygiene, School of Medicine, Johns Hopkins University; Member State Department of Health of Maryland.* W. B. Saunders Co., Philadelphia, 1927.

This is a first edition text written primarily for the medical profession. It embodies the mature experience of a professor of bacteriology at a university noted for the high quality of its product. The author has produced a work which reflects much credit upon this institution and his department.

The author devotes 170 pages to general bacteriology. This includes a brief but excellent historical introduction which is followed by a general discussion of the physical properties and vital activities

of bacteria. A chapter on destruction of bacteria follows the usual discussion of this phase of bacteriology. In the section on destruction by heat the author limits the discussion to temperature effects. In practice, temperature effects are not determined but are presumed from steam pressure readings. Harper has conclusively shown that the actual temperature obtained in a pack undergoing sterilization is frequently lower than the theoretical calculated temperature. The discussion of gas disinfection is limited to the use of sulphur and formalin.

The bulk of the book, 618 pages, is devoted to systematic bacteriology. A general chapter on taxonomy is followed by a group and species discussion of bacteria. In general the author follows the classification suggested by the Committee of the Society of American Bacteriologists, but in many details former nomenclature is retained. Little helpful influence in clarifying the confusion that already exists in this phase of bacteriology is added.

The discussion of the various bacteria is in much greater detail than is usually encountered. In the case of the true bacilli, spore bearers, the thermal death point is given.

The list of organisms is lengthy, including many that are not pathogenic.

A bibliography, sometimes extensive, concludes the discussion of each organism.

On such problems as the classification of streptococci, the author gives in detail the various systems that have been suggested.

This section presents material of much value, and its scope is not limited to medical bacteriology.

This is followed by 135 pages of general discussion, which include a section on distribution of bacteria, personal and environmental. The intestinal flora is treated in considerable detail. The chapter dealing with environmental bacteria includes material of value particularly from the standpoint of public health. Another section is devoted to the problems of infection and immunity, and includes an excellent exposition of the phenomena of anaphylaxis.

The concluding pages are devoted to discussion of the spirochetes and infectious microorganisms of undetermined character. The spirochetal organisms are treated in the same manner as are the other bacteria and in equal detail. In discussing *T. pallidum* the author does not recognize precipitin tests for syphilis to be of diagnostic value.

The section on microorganisms of undetermined character treats briefly of the clinical manifestations and etiology of the diseases caused by them. It includes some obscure animal and fowl diseases.

Some who have had personal experience might question the designation of dengue as a mild disease.

The text is well illustrated, the style is clear cut, and the publisher has maintained a high standard of product. This book can be commended to beginner and specialist as a product of superior quality.

A TEXT-BOOK OF MEDICINE, by *American authors*, edited by *Russell L. Cecil, A. B., M. D., Assistant Professor of Clinical Medicine in Cornell University; Assistant Visiting Physician to Bellevue Hospital, New York City.* Associate Editor for Diseases of the Nervous System, *Foster Kennedy, M. D., F. R. S. E., Professor of Neurology in Cornell University, Head of Neurological Department, Bellevue Hospital, New York City.* W. B. Saunders Co., Philadelphia, 1927.

This book covers the field of internal medicine in 1,450 pages, including discussion of the diseases of the nervous system, the so-called tropical diseases, mycoses, and diseases of allergy. Being written by 130 contributors, each of whom is a student or investigator of the subject upon which he has written, and most of whom are teachers of medicine in university medical colleges, the book is thorough, well planned, and well executed. Controversial matter has been eliminated, and each disease treated concisely yet adequately. The book is probably the best one-volume presentation of the subject matter of internal medicine of the present day.

SYMPTOM DIAGNOSIS, REGIONAL AND GENERAL, by *Wilfred M. Barton, A. M., M. D., F. A. C. P., Associate Professor of Medicine, Medical Department of Georgetown University and Wallace M. Yater, A. B., M. D., Fellow in Medicine, Mayo Foundation, Rochester, Minn.* D. Appleton & Co., New York, 1927.

This book is unique in its field and upon first examination one is inclined to question its necessity. However, on closer examination, and particularly if the book is used as the authors have pointed out it should be used, the first impression gives way to one of admiration at the completion of what must have been a tremendous task.

In the preface the authors state that the purpose of their book is threefold: (1) To aid the busy physician in the diagnosis of his case, by allowing him quickly to reduce the number of possibilities to a small list; (2) to prevent the oversight of important considerations; (3) to make the medical man more observant of the characteristics of the symptoms of disease."

They further state that the book is not designed for study, but for quick reference while the patient is being prepared for examination or while he is dressing after the examination. In fact the publishers have emphasized this point by placing on the outside cover this inscription, "For desk use."

The symptom is first stated and then the causes of this particular symptom are enumerated. There is also a list of diseases, in the order of importance, of which this particular symptom is a prominent or constant finding.

There can be little doubt that the careful use of this book by the practitioner of medicine will help to keep him from overlooking causes of various symptoms which might otherwise not receive consideration. No doubt a disease process is overlooked at times because in considering the individual case this possibility was not even considered. We believe this book has a definite place in medical literature and, if used in the manner in which the authors indicate, will be a decidedly helpful adjunct to the busy physician.

DISEASES OF THE DIGESTIVE ORGANS, by Charles D. Aaron, Sc. D., M. D., F. A. C. P., Professor of Gastroenterology and Dietetics in the Detroit College of Medicine and Surgery; Professor of Gastroenterology in the Detroit Post-Graduate School of Medicine; Consulting Gastroenterologist to Harper Hospital. Fourth edition, thoroughly revised. Lea & Febiger, Philadelphia, 1927.

This is the fourth edition of this work, and will no doubt be given the same reception as the three previous editions. While the author expresses himself freely on the value of gastroenterology, he does not want to isolate the consideration of diseases of the digestive organs, but has tried to reaffirm the intimate relationship between diseases of the digestive tract and the other branches of the profession, especially internal medicine.

The subject is taken up in a systematic way, beginning with the mouth, taking up in succession the esophagus, stomach, liver and bile ducts, gall bladder, pancreas, small intestine, divisions of large intestine, rectum, and anus. The chapter on the liver, bile ducts, and gall bladder has been revised. All the recent methods, as well as the older approved standard methods used as an aid in the diagnosis of gastrointestinal diseases, are described in minute detail. One whole chapter is devoted to Röntgenology. The advance of cholecystography by the use of tetrabromphenolphthalein, brought out by Graham and Cole in 1924, is fully taken up, with the advantages of using the iodine salt emphasized.

Under the diagnosis of syphilis the author states: "The Kahn precipitation test has been found to be quite as sensitive as the Wassermann. * * * This test possesses fewer sources of error than the Wassermann and has a higher specificity."

There is ample space given in the work to the nervous derangements of the digestive tract and the value of understanding the vegetative nervous system. Pharmacodynamic and physiologic tests for the diagnosis of vegetative nervous disturbances are given in detail, so that the clinician is able to use them readily.

THE NORMAL CHEST OF THE ADULT AND THE CHILD, by *J. A. Myers, Associate Professor of Preventive Medicine, Medical and Graduate Schools, University of Minnesota; Medical Director, Lymonhurst School for Tuberculous Children, Minneapolis, Minn.* Williams & Wilkins, Baltimore, 1927.

This book will take its place as one of the most important aids to correct diagnosis of the year.

The variations of the normal chest are of such a nature that the general medical man often makes a mistake in diagnosing a lung or heart condition that does not exist, thereby making the individual a mental invalid, or failing to pick up an early pulmonary tuberculosis or degenerative heart condition that needs immediate treatment. While the value to be attached to laboratory tests is not ignored, it is pointed out that objective methods can not replace the exercise of our special senses in the conduct of a physical examination. One of our great physicians once said: "With all our varied instruments of precision, useful as they are, nothing can replace the watchful eye, the alert ear, the tactful finger, and the logical mind which correlates the facts obtained through all these avenues of information and so reaches an exact diagnosis."

The heart sound often referred to as the functional murmur, impure heart sound, or the accidental murmur is here referred to as the "unimportant murmur."

The author in collaboration with several professors of the University of Minnesota, has produced a book worthy of high praise and of great value to the practicing physician.

TUBERCULOSIS: BACTERIOLOGY, PATHOLOGY, AND LABORATORY DIAGNOSIS, WITH SECTIONS ON IMMUNOLOGY, EPIDEMIOLOGY, PROPHYLAXIS, AND EXPERIMENTAL THERAPY, by *Edward R. Baldwin, M. D., Director of the Trudeau Foundation, S. A. Petroff, Ph. D., Bacteriologist and Director of Trudeau Sanitarium Research and Clinical Laboratory, and LeRoy S. Gardner, M. D., Pathologist and Director of Saranac Laboratory for the study of Tuberculosis, Saranac Lake, N. Y.* Lea & Febiger, Philadelphia, 1927.

As the title indicates, only the laboratory aspects of tuberculosis are considered. A thorough, but compact, review of the biology and bacteriology of the tubercle and other acid-fast bacilli is given in the first chapters. This is followed by detailed consideration of the gross and histological pathology of tuberculosis in all organs, with special reference to the lungs. The third section is devoted to a thorough and complete consideration of all laboratory diagnostic methods of practical use in tuberculosis as well as the methods now in the experimental stage. The closing chapters are devoted to tuberculin and experimental therapy.

The very latest work in the various phases of the subject is described and discussed in detail. The present status of the "B. C. G." vaccine of Calmette, which has received considerable attention in

Europe, is reviewed. The complement-fixation test for diagnosis as employed in the Trudeau laboratories is given in detail. This test is considered a valuable aid in diagnosis. Many refined methods of staining and culturing the tubercle bacillus are described in detail. There are numerous fine and original photographs of both gross and microscopical pathological specimens. The several charts have been devised from recently gathered statistics. One of the outstanding features is the excellent and complete bibliography at the end of each chapter.

This book, a product of a world renowned center of research in tuberculosis, may well be read by practitioner, student, and specialist alike.

MEDICAL SCIENCE FOR EVERYDAY USE, by Shields Warren, A. B., M. D., *Instructor in Pathology in the Harvard Medical School; Pathologist, Palmer Memorial Hospital, Boston, Mass.* Lea & Febiger, Philadelphia, 1927.

In his preface the author states that he has revised, rewritten, and collected in this volume of 178 pages, articles on subjects of current medical interest which appeared in the Boston Sunday Herald. The reader, however, will find the context far above the standard of the usual newspaper or magazine article. The various subjects are well covered from a scientific and medical standpoint, and yet are written in such a way as to be readily understood by the layman, for whom the book is intended.

Of particular interest are the simple but complete explanations of the Shick test, the Dick test, and the typing of pneumococci; also, the use of ultra-violet radiation in tuberculosis and rickets, and the use of insulin in diabetes.

An excellent index completes the book.

While not intended primarily for the physician, this little volume is a valuable addition to the library and may well be placed upon the waiting-room table.

The naval medical officer will find this book useful to him especially in family practice and during the annual physical examinations, and may unhesitatingly recommend its purchase to such patients as need a rational, simple, but none the less scientific guide for the medical problems of modern life as a supplement to his own instructions.

MANAGEMENT OF SICK INFANTS, by Langley Porter, B. S., M. D., M. R. C. S. (Eng.), L. R. C. P. (London), *Professor of Clinical Pediatrics*, and William E. Carter, M. D., *Instructor in Pediatrics, University of California Medical School, San Francisco.* Third revised edition. C. V. Mosby Company. St. Louis, 1927.

This is the third edition to appear in the past five years.

The book is divided into three parts. The first part deals with the predominant symptoms found in the diseased or upset infant.

The "General consideration" of the sick infant found in the first chapter is well worth reading carefully for a general résumé of the subject. The remaining chapters of the first part deal with vomiting, diarrhea, constipation, nutrition, hemorrhage, pain and tenderness, convulsions and syncope, fever, cough, and prematurity, with a brief discussion of diseases and abnormal conditions in which these symptoms are prevalent. Many differential points of diagnosis are brought out in this section of the book.

Part two gives a full discussion of the diseases and abnormal conditions that serves as a cross index of diagnostic points—symptoms versus disease. A detailed method of treatment is given for each disease.

The third part takes up the methods of diagnosis and treatment in detail. The chapter on formulas and receipts is excellent. There is a chapter covering drugs that gives all well-known standard prescriptions for different infant diseases.

The authors are worthy of praise for producing a book of this character, making it easy to read, understand, and an aid in actual practice

PRACTICAL LECTURES ON THE SPECIALTIES OF MEDICINE AND SURGERY. Delivered under the auspices of the medical society of the County of Kings, Brooklyn, N. Y. (Second series, 1924-1926.) Paul B. Hoeber (Inc.), New York, 1927.

Each winter there is a series of practical lectures given by the Kings County Medical Society with the purpose of providing the doctor an opportunity to add to his knowledge in small doses, in a homely, practical manner. The spring series of 1927 marks the sixth year of these famous talks.

The first volume of this series, containing the lectures delivered in 1923-24, received a most favorable notice in the *BULLETIN*. The present volume is larger than its predecessor but the high level of practical value of its contents is fully maintained. For the medical officer who is doing family practice or one who is on duty at any of the shore stations beyond the seas it would prove a most practical aid.

All the lectures are by men of distinction in their special fields. No better way can be found of indicating the importance of the volume than to mention the titles of a few of the 37 lectures: Some practical aspects of the cancer problem; The ambulatory sick; The colon; The newer remedies; The colds of childhood; The doctor in court; Common sense in the treatment of fractures; Border lines of mental disease; The medical problems of pregnancy; Fits.

A PRACTICAL TREATISE ON DISEASES OF THE SKIN, by *Oliver S. Ormsby, M. D.*, *Clinical Professor and Chairman of the Department of Dermatology, Rush Medical College of the University of Chicago; Dermatologist to the Presbyterian, Saint Anthony's and West Suburban Hospitals.* Third edition. Lea & Febiger, Philadelphia, 1927.

This is the third edition of Ormsby's work and provides a well-considered compromise on what should be included in a textbook covering the subject of dermatology.

The first 117 pages are devoted to anatomy and physiology of the skin, general symptomatology, etiology, pathology, diagnosis, prognosis, and therapeutics of cutaneous diseases, to familiarize the student with the terminology peculiar to this branch of medicine.

The classification of cutaneous diseases used conforms closely to that used by Hebra and modified by Crocher, Duhring, and others.

Thirty new diseases have been added, several chapters rewritten, and the entire work brought up to date. Seventy-six new illustrations have been added. The book is well written, the type easily read, and the plates excellent. It is perhaps noteworthy, that, designedly or otherwise, there is no mention of the Kahn test.

This is a superior work on skin diseases.

PRACTICAL METHODS IN THE DIAGNOSIS AND TREATMENT OF VENEREAL DISEASES, by *David Lees, D. S. O., M. A., M. B., F. R. C. S., Surgeon in Charge of Venereal Diseases, The Royal Infirmary, Edinburgh; etc.* William Wood & Co., New York, 1927.

Of convenient size, this volume contains a wealth of practical information supplemented by 87 half-tone plates reproduced from actual photographs. Divided into two parts, the first deals with syphilis, and includes a chapter on chancroid; the second, with gonorrhea.

Part I gives a very full and accurate description of syphilis in all its stages and complications, and an unusually complete discussion of treatment in all its phases. The differential diagnoses of the various lesions are particularly good.

Part II is a splendid discussion of gonorrhea in both the male and female. Symptoms and treatment of acute and chronic gonorrhea, with all their complications, in both male and female, are considered separately. Additional chapters deal with stricture of the urethra, the use of the urethroscope, and treatment by vaccines.

An unusual feature of this volume is a section of 26 pages headed "Pharmacopœia," which groups under this caption all diets and medical treatments used in the care of cases of syphilis and gonorrhea.

A very comprehensive index completes the book.

The reader can not but be impressed with the sincere and practical method this author has used in discussing his subject, and will

feel that the information which he imparts has been gained from a wide and varied experience in which the procedures of diagnosis and treatment have been thoroughly tested and found the most satisfactory from his point of view.

This is a book which any physician will be glad to own.

LECTURES ON INTERNAL MEDICINE (DELIVERED IN THE UNITED STATES, 1926), by *Knud Faber, M. D., Professor of Internal Medicine, University of Copenhagen, Denmark.* Paul B. Hoeber, Inc., New York, 1927.

Four lectures delivered during Doctor Faber's visit to the United States early in 1926 as a guest of the American College of Physicians: "The etiology and pathogenesis of achylia gastrica," "The intestinal origin of pernicious anemia," "Benign glycosuria," and "Historical outline of medical therapy." In the first three, by means of his own careful and valuable observations, he formulates and develops his theories in an orderly and logical manner. While his hypotheses are neither wholly new nor startling, his manner of presenting his evidence and arriving at his conclusions makes the reading of this little volume a distinct and instructive pleasure. In the last lecture of the series he briefly traces the progress of treatment from its early and entirely symptomatic concepts through the various phases and eras that have led up to our present methods and, at the same time, shows the influences by which the changes have come about. "Nosography creates the diseases, opens our eyes to the individuality and existence of the diseases, while experimental pathology seeks to reproduce these diseases and experimental therapy aims at their treatment; in the clinic the final test and the establishing of the results are carried out. It is at the bedside we commence our labors and at the bedside we terminate them."

EXAMINATION OF CHILDREN BY CLINICAL AND LABORATORY METHODS, by *Abraham Levinson, B. S., M. D., Associate in Pediatrics, Northwestern University Medical School; Attending Physician, Children's Department, Cook County Hospital, Chicago.* Second edition. The C. V. Mosby Co., St. Louis, 1927.

To the reviewer, whose contact with children, like that of most medical officers, is occasional and incidental, this book of Doctor Levinson's appears to be of great interest and value as an authoritative and handy reference book. Methods of clinical procedure, history taking, physical examination, collection of specimens, the interpretation of clinical laboratory procedures, and the difference in normal standards between children and adults are items with which the medical officer or, indeed, the general practitioner is not usually thoroughly conversant. This book supplies the need for a readily available source of information on these subjects and, in addition, describes the technique of the more common present-day laboratory tests of reasonably easy accomplishment.

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ULTRA-VIOLET RADIATION AND ACTINOTHERAPY, by *Eleanor H. Russell, M. D., B. S. (Dunelm)*, and *W. Kerr Russell, M. D., B. S. (Dunelm)*, *Honorary Actinotherapist, Sun-Ray Clinic, Newcastle-on-Tyne*. Second edition. William Wood & Co., New York, 1927.

The authors of this volume show by the text that they have given considerable time and study to the subject of ultra-violet radiation. They give in clear and concise language the historical and scientific aspects of both the natural and artificial ultra-violet rays. The chapters on the physical properties and the biological effects of ultra-violet rays are comprehensive and are well worth consulting by anyone who expects to make use of these rays but does not understand thoroughly their field of usefulness or limitations and dangers. The treatment of tuberculosis and skin diseases by the rays are given separate chapters and are adequately covered. The observations on the treatment and prevention of rickets should be of special interest to specialists in pediatrics. Anyone wishing to install ultra-violet apparatus should consult a book of this kind before purchasing equipment, as the chapters dealing with apparatus contain many valuable statements in regard to the capacity and limitations of various types of lamps. An extensive bibliography is appended.

HEART AND ATHLETICS, by *Felix Deutsch, M. D., Privatodocent in Internal Medicine at the University of Vienna*, and *Emil Kauf, M. D., Assistant at the "Heart Station" in Vienna*. C. V. Mosby Co., St. Louis, 1927.

The subject matter of this volume contributes valuable information from a clinical standpoint obtained from the examinations of several thousand Viennese athletes followed by several years of control. Heretofore theoretical views are confirmed or disproved and hypertrophy of the heart muscle rather than dilatation is established. Adequate tables are given comparing age, types of exercise, heart measurements, and percentages of pathology. Voluntary and competitive athletics are compared, together with the relative effects of the various kinds of exercises. Rowing, bicycling, and skiing stand at the top, while boxing, football, and fencing rarely give rise to cardiac enlargement. Cases of familial enlarged hearts permit of no restraint under observation, and types of the nervous heart may reveal no exercise changes.

The treatise is valuable from its negative as well as its positive findings, and with the data collected from a large number of reported examinations, accurately measured by teleroentgenography, convincing facts are added to a too scarce literature on this subject.

PRINCIPLES OF CHEMISTRY, by *Joseph H. Roe, Ph. D., Professor of Chemistry, George Washington University Medical School; Captain, Sanitary Division, United States Medical Reserve; etc.* The C. V. Mosby Co., St. Louis, 1927.

An excellent textbook for nurses and others who would study applied chemistry in relation to physiology. Hospital Corps men

of the Navy should find it especially useful in preparing for advancement in rating. The text exemplifies the type of chemical knowledge which is useful to those who come in professional contact with physicians and patients. The book is conveniently arranged, well illustrated, and easy to read.

CLINICAL NEUROLOGY, for Practitioners of Medicine and Medical Students. Largely based upon the book by Prof. Dr. Hans Curschmann, Rostock, Germany. (A free translation with changes and additions.) By *Edward A. Strecker, A. M., M. D., Professor of Nervous and Mental Diseases, Jefferson Medical College, Philadelphia; Attending Neurologist to the Jefferson, Philadelphia, and Pennsylvania Hospitals; Consulting Psychiatrist and Lecturer to Yale University Medical School, etc.; and Milton K. Meyers, B. S., LL. B., M. D., Neurologist to the Northern Liberties Hospital, Philadelphia; Chief of Neurologic Clinic to the St. Agnes Hospital, Philadelphia, etc.* P. Blakiston's Son & Co., Philadelphia, 1927.

A brief exposition of the ordinary neurological diseases, in a form designed to be available and helpful to the physician. An excellent manual for practitioners and students. This book will help the general practitioner to recognize the common neurological affections. It will show him how to treat them and when to call in the neurologist for consultation.

In addition to the contents that one might expect from the title, there are excellent chapters on brain tumor, brain abscess, vertebral trauma, headache and migraine, Graves's disease and myxedema, vasomotor and trophic neuroses.

With each disease there is a brief tabulation of the chief points of interest for the practitioner, with the principal signs and symptoms of the disease. A valuable book for any physician.

TRANSFUSION OF BLOOD, by *Henry M. Feinblatt, M. D., Assistant Clinical Professor of Medicine, the Long Island College Hospital, Brooklyn, N. Y., Hematologist to the United Israel-Zion Hospital; etc.* The MacMillan Co., New York, 1926.

In a little over 100 pages the author discusses blood transfusion: Blood groups, blood donors, indications for, dangers of, and untoward results from blood transfusion. He compares the various methods of blood transfusion and gives his own method. A few pages are devoted to blood transfusion in children.

DEFECTIVE MEMORY, ABSENTMINDEDNESS, AND THEIR TREATMENT, by *Arnold Lorand, M. D.* F. A. Davis Co., Philadelphia, 1926.

In large part, this book deals with the influence of disturbances of internal secretion upon the memory and methods of treatment for defective memory based upon correcting these disturbances. It also gives other methods by which loss of memory may be prevented or retarded. Among these are proper diet, periods of mental rest, and the selection of proper material to be stored in the memory.

The book is easily read and will be of interest to that large group of people who find their memory failing, as well as to the physician who is consulted by them.

THE INTERNATIONAL MEDICAL ANNUAL, a Yearbook of Treatment and Practitioner's Index. Forty-fifth year, 1927. William Wood & Co., New York.

This is essentially an alphabetical arrangement of reviews of the year's work in the treatment of disease. There is much of interest in this volume, as, for example, serum therapy (especially in poliomyelitis); the lead treatment of cancer; treatment of actinomycosis by iodine in milk; and the use of bismuth in syphilis when arsenic is contraindicated, or when arsenic is not well tolerated by patient. Several pages are devoted to a discussion of phototherapy. The book is a valuable aid to the medical man who wants to keep up to date in his profession.

IMMUNITY IN SYPHILIS, by *Alan M. Chesney, Johns Hopkins Medical School* (Medical monographs, Volume XII). The Williams & Wilkins Co., Baltimore, 1927.

This little book represents a most extensive and thorough review of the voluminous work which has been done on immunity in syphilis. While nothing new nor definite is recorded, the work which has been done is summed up in a very concise and clear manner. For a complete review of the immunologic factors in syphilis, this monograph is recommended.

A MANUAL OF GYNECOLOGY, by *John Osborn Polak, M. Sc., M. D., F. A. C. S., Professor of Obstetrics and Gynecology, Long Island College Hospital; Professor of Obstetrics in the Dartmouth Medical School; Fellow American Gynecological Society, American Association of Obstetricians, Gynecologists and Abdominal Surgeons, New York Academy of Medicine, etc.* Third edition, thoroughly revised. Lea & Febiger, Philadelphia, 1927.

A new edition of a standard text-book. The work is too well and too favorably known to require much comment. The new edition excels the old.

PRACTICAL GASTROSCOPY, by *Jean Rachet, M. D., Assistant to the Hôpital St. Antoine, Paris.* Authorized translation by *Fred F. Imianitoff, D. S. C., B. A., M. R. C. S., Assistant to the Gynecological Research Department, Institute of Anatomy, Brussels.* William Wood & Co., New York, 1927.

Endoscopy of other organs has advanced so far and overcome so many obstacles that there is no doubt of eventual success in practical visualization of the stomach.

This book records the results of three years of research in gastroscopy. Instruments were improved, technic was developed and 60 gastroscopic examinations were made.

The author concludes that gastroscopy must remain an exceptional method of examination of the stomach, taking place in the scale of clinical investigations after the X-ray examination and before the exploratory laparotomy.

URINARY SURGERY, A handbook for the general practitioner, by *William Knox Irwin, M. D., F. R. C. S. E., Surgeon to Out-Patients, St. Paul's Hospital, for Genito-Urinary Diseases, Endell St. W. C.; Formerly Chief Clinical Assistant, Genito-Urinary Department, West London Hospital and Clinical Assistant St. Peter's Hospital, for Stone and other Urinary Diseases.* Second edition, revised and enlarged. William Wood & Co., New York, 1927.

The first two chapters deal with the anatomy of the genito-urinary tract and methods of examining the patient. In the next seven chapters the various diseases are discussed on a basis of the presenting symptom. There is a chapter on the pathological conditions of the prostate in later life and then four chapters descriptive of various operations. There are no illustrations.

An elementary manual, designed for the student and general practitioner.

CYSTOSCOPY, by *Jas. B. MacAlpine F. R. C. S. (Eng.).* William Wood & Co., New York, 1927.

This is an attractive book, profusely illustrated, and contains 12 excellent colored plates which are faithful reproductions of various cystoscopic pictures one encounters in the bladder.

The author goes into great detail in describing each step in connection with cystoscopy and calls attention to many conditions which cause failure and how to remedy them. The reviewer believes that this book is only of value to one who does an occasional cystoscopy, because there is no attempt made to go thoroughly into the etiology, pathology, and treatment of all the various urological conditions requiring cystoscopy.

Most standard text books on urology contain sufficient information to enable one to carry out cystoscopy satisfactorily and interpret one's findings and have the added advantage of treating the subject of urology in its entirety, which this book makes no attempt to do.

PRACTICAL OTOTOLOGY, by *Morris Levine, M. D., Associate Professor of Otology, New York Post Graduate Medical School and Hospital, etc.* Lea & Febiger, Philadelphia, 1927.

"Practical otology" well describes this book. The author discusses all phases of otology, placing special emphasis on the value of treatment.

The medical officer doing general work will find this compact book of the greatest service. His greatest concern is what to do for the patient. This information can be readily obtained without being

confused by a mass of detail. One is impressed by the common sense used throughout.

The chapter dealing with the internal ear is disappointing. The author presents nothing new on the labyrinth. With this reservation this book is strongly recommended.

COMPENDIUM OF REGIONAL DIAGNOSIS IN AFFECTIONS OF THE BRAIN AND SPINAL CORD, by *Robert Bing, Professor in the University of Basle*. Translated from the sixth German edition by *F. S. Arnold, B. A., M. B., B. Ch. (Oxon)*. Third edition, revised and enlarged. The C. V. Mosby Co., St. Louis, 1927.

To the student this is a work of great value, furnishing, as it does, the necessary knowledge of the anatomy and physiology of the nervous system and an adequate introduction to the intricacies of neurological diagnosis. To the neurologist it furnishes a reference book of highest character because of its authority. To the general practitioner, as an occasional guide to localization of neurological lesions, it will be of lesser value because its arrangement and indexing will not furnish him quickly the information he desires. The author has made an attempt to meet such a need and has succeeded to a limited degree. It is probable that extreme brevity combined with accuracy is impossible in so complex and difficult a subject.

GUIDEBOOK TO THE PORTS OF ASIA, WITH NOTES ON SHOPPING, by *James A. Randall, Captain, Medical Corps, United States Navy*. Philippine Education Co. (Inc.), Manila, 1926.

The author of this little book, during his tours of duty on the Asiatic station, has acquired a vast fund of information concerning the ways of the oriental merchant. Much of this information has found its way into the book, and its careful study will save the newcomer to the Orient from many of the pitfalls that beset the unwary purchaser of curios, jewelry, furniture, rugs, and other mementoes of a visit to the east. The shops listed are those that have been found most reliable as to quality of goods and charges. The prospective voyager to the Orient, whether naval or civilian, will do well to obtain one of these books and to keep it with him for reference during his travels.

THE DIVISION OF PREVENTIVE MEDICINE

Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

A STUDY OF 2,000 HEALTH RECORDS CONTAINING ENTRIES FOR SYPHILIS

By H. H. MONTGOMERY, Lieutenant Commander, Medical Corps, United States Navy

In 1905, Schaudinn and Hoffman discovered a microorganism in the primary lesion of syphilis and in the swollen lymphatic glands, to which they gave the name, *Spirochaeta pallida*. It was not long before that organism, which is now known as *Treponema pallidum*, was established as the causative agent of syphilis, making it possible to differentiate this disease from all other infections. Since about 1910, under most conditions, it has been possible for medical officers of the Navy to make use of a complement-fixation test as an aid in diagnosis and as a guide in treatment. In view of the studies and experiences reported by many syphilographers in the literature of syphilis during the past two decades, one would expect case records of syphilis in the Navy written in the last decade to be quite complete and satisfactory respecting acceptable criteria of diagnosis and need for treatment.

There have been indications, however, that convincing evidence is not being obtained or recorded to support the diagnosis in many cases, and for various reasons the treatment and management of syphilitic patients in the Navy is not so good as it should be with existing knowledge of the disease.

Several months ago the Bureau of Medicine and Surgery deemed it desirable to have as many as possible of the health records of persons infected with syphilis reviewed, and the Surgeon General of the Navy assigned the writer the task of making the study. Among the objects in mind were the following: (a) To consider the evidence relating to diagnosis as presented, (b) to determine whether proper and sufficient treatment had been given, (c) to evaluate if possible factors which seemed to lead to complications, and (d) to observe the manner in which cases were recorded and note shortcomings of medical officers in this respect with a view to determining what action might be required to promote better recording.

In attempting to study any disease by using the health records on file in the Bureau of Medicine and Surgery as case papers, a difficulty is immediately encountered. The method of filing the records is designed primarily to make them quickly available, principally for pension purposes. Records are filed according to the names of individuals, and no index is maintained as to their contents. This system admirably serves the purpose for which it was devised, but much information that might be valuable for the study of various conditions becomes relatively inaccessible. Even if the information were readily available, the health records themselves are intended primarily as pension records. In general, they do not contain complete case histories.

To obtain the records of syphilitic patients, bound copies of smooth Form F were used, and from these the names of men admitted with syphilis or its complications were taken. The health records were then removed from the file, and all entries for syphilis were transferred to cards devised for the purpose. The records for the years 1922 and 1923 were used for the study, and the cases may be regarded as representing fair random selection. No health record was excluded for lack of adequate data; a card was prepared for each as it came to hand. The figures presented do not represent all cases that occurred in the Navy.

A large number of the men admitted in 1922 and 1923 are still in the service, and, with the present system of recording syphilis, there is nothing on file in the Bureau of Medicine and Surgery relating to such cases, except Form F cards, until the men's records are permanently closed and sent in for file.

Nevertheless, it was found that a majority of the men admitted for syphilis during the two years mentioned had completed the enlistment during which the admission occurred. Consequently the medical history sheets from their records were available.

In many cases the men had been infected for several years, and had been readmitted to the sick list on account of syphilis in one of the years in question. Inasmuch as readmissions as well as original admissions were traced, it is believed that the series studied represented a fair random sampling of Navy cases for most of the purposes in mind.

In all, 2,267 records were studied. The distribution among men of different ratings is shown in Table No. 1:

Table No. 1

Officers (Navy, Marine Corps, and midshipmen)	40
Chief petty officers (all ratings)	96
Seaman branch (exclusive of chief petty officers)	584
Boatswain's mates and coxswains	53
Gunner's mates and torpedomen	35
Seamen	496

Artificer branch (exclusive of chief petty officers).....	122
Radlomen, signalmen, and quartermasters.....	48
Various trade ratings.....	74
Artificer branch, engineroom force.....	481
Water tenders.....	41
Firemen.....	297
Special branch.....	101
Hospital Corps men.....	50
Musicians.....	13
Yeomen, storekeepers, and buglers.....	38
Commissary and messmen branch.....	173
Cooks, bakers, mess attendants, and stewards.....	173
Aviation branch (all ratings).....	17
Marines (all enlisted ranks).....	653
Total of cases studied.....	2,267

All of the patients were white men except as indicated by Table No. 2:

Table No. 2

Branch	Negro	Filipino	Other races
Messmen and commissary.....	72	36	1
Firemen.....	1	1	1
Machinists' mates and enginemen.....	1	0	1

Table No. 3 shows the proportionate numbers of infected men belonging to the several branches of the service in the series studied in comparison with the percentages of men in those branches serving in the Navy:

Table No. 3

Branch	Per cent in this study	Per cent in Navy
Seaman.....	26.2	35.4
Artificer.....	5.5	6.5
Artificer, engine-room force.....	21.6	16.7
Special.....	4.5	7.7
Commissary and messman.....	7.8	6.4
Aviation.....	.8	1.5
Chief petty officers.....	4.3	7.7
Marines (all enlisted ranks).....	29.3	18.1
	100.0	100.0

The ages at which individuals whose records were studied were infected are shown in chart No. 1:

It was impossible in 13 per cent of the cases to determine the patient's age at the time of infection. There were a number of different reasons for this. In some cases the disease was not recognized until after the primary stage and no evidence regarding the date of infection was recorded. Doubtless in certain instances such

evidence was not obtainable. In other cases the man had completed the term of enlistment during which the diagnosis was established, had reenlisted, and was still in the Navy while this study was being made. Under such circumstances the yellow syphilitic abstract sheet is carried in the current health record, and unless the medical officer who studied the case entered the required information on a clinical history sheet as well as on the abstract the reviewer could not determine when the disease was acquired. Some of the men had been admitted to the sick list so frequently for gonorrhea and chancroid

AGE AT WHICH INFECTED WITH SYPHILIS .

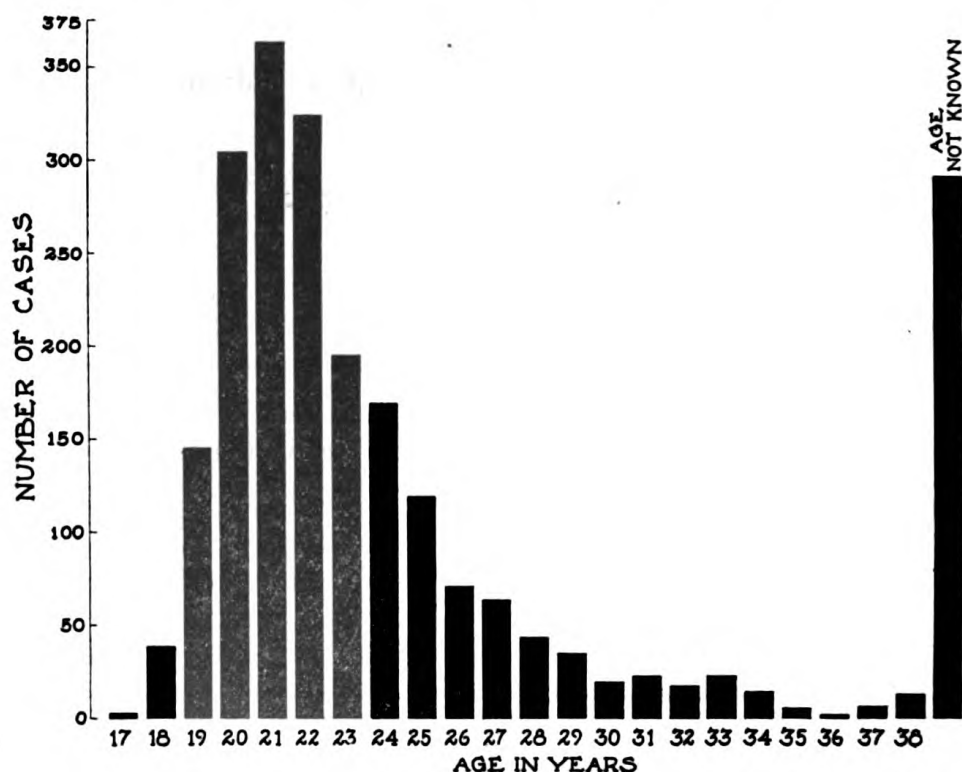


CHART 1

that the date of the syphilitic infection could not be determined either by the patient or the medical officer.

The places in which the men contracted syphilis were listed. The data are too voluminous to present here, especially as no information particularly worthy of note was elicited. It appeared that the infections were contracted in practically every port in which liberty is granted and from widely scattered inland cities to which the men go on leave or shore duty. Among the marines, about half the total number of infections were acquired in Haiti or Santo Domingo, but when the number of men on duty there in 1922 and 1923 and the conditions in those countries are taken into consideration this propor-

tion does not seem greater than might be expected. The employment of a number of marines on mail-guard duty late in 1921 and early in 1922 and the summer maneuvers of the force at Quantico resulted in many infections in towns and cities far removed from any naval establishment.

Among the Navy personnel the east coast cities furnished more infections than the west coast ports. It should be remembered, however, that during the two years covered by this study large numbers of men were being transferred from the east to the west coast. Cases contracted by men while serving on the Asiatic station did not form so high a percentage of the total as was anticipated. The data available of course did not permit one to estimate the percentage of men on duty there who became infected. Such information can only be obtained from the regularly collected morbidity statistics, or by a special survey.

Eight Hospital Corps men were regarded as having contracted syphilis "in the line of duty," infection having been ascribed to injuries while aiding in the treatment of syphilis.

As the case histories were being abstracted the history of other venereal infections was noted. It was found that about one-third of the patients—736—had no history of any other venereal disease; 563 had a history of gonococcus infection; and the others included 456 who had had chancroid, and 335 who had had both gonorrhea and chancroid. These figures do not take into account the number of times a man might previously have been admitted for one infection or another. Some of the records seemed to indicate that the patient was barely cured of one of the venereal diseases before he acquired another. In other instances the health record seemed to indicate that the man was unfortunate on one occasion and had learned his lesson in regard to avoiding further infection. In general, one gained the impression that the majority of the men in the Navy who acquire syphilis are those whose sexual contacts are frequent and not followed by proper prophylaxis, as reflected by their admission for other venereal diseases, and that the law of chance makes it only a matter of time before they become syphilized.

The records of 2,090 enlisted men of the Navy and Marine Corps, including chief petty officers, out of the total 2,267 records studied, were sorted to determine the reasons leading to separation from the service, it being understood, of course, that all enlisted men whose records were in the file had completed at least one term of enlistment or had been discharged for some other reason. Of those whose enlistments expired, 314 had reenlisted. Table No. 4 shows the numbers discharged upon expiration of enlistment and for various other reasons. Of the 1,545 who were discharged by reason of expiration of enlistment, 314 reenlisted.

Table No. 4

Expiration of enlistment.....	1,545
Special order discharge.....	58
Invalided from the service (nonsyphilitic conditions).....	78
Invalided from the service for syphilis (messmen).....	19
Died (nonsyphilitic conditions).....	22
Bad conduct discharge.....	148
Undesirable discharge.....	39
Dishonorable discharge.....	37
Deserted.....	127
Transferred to reserve.....	17
Total.....	2,090

It is often considered that infection with syphilis and the treatment offered by the Navy is a factor leading many men to reenlist. This study does not seem to support such a belief. Approximately 60 per cent of the men whose records were reviewed left the service upon expiration of enlistment and only 15 per cent reenlisted. However, a considerable number were separated from the service under conditions which made reenlistment impossible or improbable. Disregarding such cases, but assuming that men who were discharged by special order were eligible for reenlistment, we have a total of 1,603 men who may be considered as eligible. It appeared that 19.5 per cent reenlisted. This is a considerable proportion to be sure, and, doubtless, the advantage of receiving treatment in the Navy led some of the men to reenlist, but the percentage of reenlistments in this group was not so great as one might have expected.

Table No. 5 indicates by ratings the percentages of those assumed to be eligible who had reenlisted when their records were reviewed and shows corresponding percentages for all men of those ratings in the Navy and Marine Corps:

Table No. 5

	Number in this study	Eligible for reen- listment	Number reen- listed	Percentage of reen- listments	
				This study	Whole Navy
Boatswain's mates and coxswains.....	49	38	19	50.0	51.6
Gunner's mates and torpedomen.....	34	29	13	44.8	48.3
Seamen.....	479	349	57	16.3	53.2
Radiomen, signalmen, and quartermasters.....	47	42	18	42.8	44.7
Various trade ratings.....	71	61	17	27.8	41.6
Water tenders.....	36	30	15	50.0	66.0
Machinist's mates and enginemen.....	134	114	28	24.5	47.3
Firemen.....	285	217	38	17.5	47.4
Hospital Corps men.....	48	37	7	18.9	58.1
Musicians.....	11	8	2	25.0	64.6
Yeomen, storekeepers, and buglers.....	37	28	9	32.1	56.6
Mess attendants, cooks, bakers, and stewards.....	163	109	27	24.7	75.8
Aviation ratings.....	15	12	2	16.6	67.7
Chief petty officers (all ratings).....	58	41	25	60.9	91.0
Marines (all enlisted ranks).....	623	488	37	7.5	18.1

The figures for the Navy are only approximate, being based on experience in the fiscal year 1923, but those for the Marine Corps are based on average figures for the calendar years 1922, 1923, and 1924. The seamen, firemen, and marines represent largely men serving in their first enlistments.

Some of those who contracted syphilis may have left the service when their enlistments expired to follow occupations in civil life under conditions where it would not be known that they were infected or where the disease might not be a handicap. Others may not have realized the serious nature of the disease. It is to be borne in mind that men of these ratings are generally young.

Some special significance probably attaches to the reduced percentages of infected Hospital Corps men who reenlisted. The desirable types of men in the Hospital Corps are probably less liable to contract syphilis in the first place. Many of those who became infected were probably misfits who would have left what was to them an uncongenial environment in any event as soon as their terms of service expired.

The men holding aviation ratings also represent a selected group. In general, they must understand that a history of syphilis would be a serious impediment to their advancement in the Navy, and it may be that those among them who contracted syphilis felt that they would be more successful in seeking work in civil life for which they were qualified.

Also 25 per cent of the syphilitic mess attendants, cooks, bakers, and stewards reenlisted. It might be thought that so many should not be permitted to reenlist but it will be noted that the percentage of reenlistment for all men of these ratings is very high—75.8 per cent. There is no evidence that any considerable number of infected food handlers have infected other persons in the Navy. It may be assumed, of course, that no man holding such a rating was permitted to reenlist while his disease was in such a stage as to make him a menace to the health of others.

Rated men as a whole showed fairly high percentages of reenlistments although the percentages were not so great as for the entire Navy.

Evidence bearing upon diagnosis.—In sorting the records, with respect to criteria of diagnosis, it was found that the cases fell naturally into 20 groups as shown in Table No. 6.

Table No. 6

Chancre:	
Serum reaction	358
Adenopathy	222
Skin lesions	222
Mucous membrane lesions	36
Skin lesions	85
Skin and mucous membrane lesions—adenopathy	22

Chancre—Continued.

Dark field	266
Serum reaction	85
Skin and mucous membrane lesions—adenopathy	22
Skin lesions	38
Adenopathy	76
Skin and mucous membrane lesions—adenopathy	63
Chancre alone	49
Serum reaction :	
Skin lesions—adenopathy	45
Skin lesions	45
Skin and mucous membrane lesions—adenopathy	53
Adenopathy	74
Serum reaction alone	106
Skin lesions—adenopathy	30
No data available	4

The majority of the diagnoses were made in the secondary stage of syphilis.

In considering this phase of the study the writer realizes the difference between having the patient before one, weighing the clinical evidence thus obtained, and taking the same sort of evidence as noted by another observer in attempting to say whether the patient had syphilis or not. A clinician who makes a diagnosis only after careful deliberation may not have the gift of recording his observations by words that will indicate the care and judgment he has exercised. On the other hand, a man whose study was more or less superficial may be a more adept scribe, and his diagnosis may appear sound even though the evidence presented could not have been substantiated.

In some of the cases in which the diagnosis was established in a naval hospital, the records indicated, apparently, that the diagnosis was based entirely upon a positive complement fixation test made merely as a matter of routine. In view of the fact that the patient was probably seen by a medical officer who was really qualified to determine whether the man had syphilis, it may probably be taken for granted that the case would not have been pronounced syphilis without sufficient evidence, but the failure to make a proper record is inexcusable. In justice to naval hospitals it must be said that some of the most complete data showing careful study were recorded there. Of course many of the cases appear to have been studied carefully and were well written up by medical officers not attached to hospitals. On the other hand, records which were incomplete sources of information, either because of faulty observation and failure to write the case up properly at the time the patient was admitted with syphilis, or because of failure afterwards to make proper entries as circumstances indicated, can not be said to have been prepared exclusively by medical officers on any particular kind of duty.

The groups shown in the table may be combined to indicate roughly the stage of the disease in which the diagnosis was made. For example, if a man had a chancre and a positive serum reaction, presumably he also had a certain amount of glandular involvement. The figures were not combined in the table because in such cases glandular enlargement, if detected by the medical officer, was not entered in the record. Other combinations of the same kind will suggest themselves to the reader.

The cases in which a primary lesion was one of the diagnostic criteria constitute about 80 per cent of the total. Closer study of these, however, will lead to the conclusion that all of them do not present sufficient justification for a diagnosis. For instance, take, first, the largest single group, cases diagnosed from the presence of a lesion thought to be a chancre with a positive serum reaction. Under proper conditions this is undoubtedly sufficient evidence to warrant a diagnosis, but the fact that falsely positive serum reactions are sometimes obtained must be borne in mind. Moreover, errors in technique are possible. In most instances of this sort the medical officers who treated the patients were doubtless justified in regarding the cases as syphilis, but it should be observed here that such incomplete evidence is not altogether convincing to one reviewing the cases, especially concerning those in which apparently the diagnosis of syphilis rested upon the presence or history of a lesion which followed the course of a chancroid, and led to a suppurating bubo during the progress of which a single positive serum reaction was obtained. It was all the more difficult to judge whether the man really had syphilis in cases where the health record indicated that after very little treatment, a negative serum test was reported, and apparently the serum was never again tested or a positive reaction was not subsequently obtained.

In some cases syphilis was entered in the record on the basis of such evidence, and within a year, during which no treatment for syphilis was given, the man reported with another lesion from which the *Treponema pallidum* was demonstrated by dark field illumination. The records also described cases in which on the basis of a single positive blood test, a lesion recorded as chancroid six or more months earlier, was considered to have been a chancre and the man was given a "yellow ticket" for the rest of his career. Such cases were frequently found. On the other hand, there were cases in which the patient was reported to have presented a suspicious lesion in which the presence of *Treponema pallidum* was not or could not be demonstrated, and the serum reaction was negative, possibly two or three times, but later a weak positive reaction developed, followed in a few days by a stronger positive, not until after which was the diagnosis made. The diagnosis in such a case may be regarded as needing no

additional support. These examples stand at about opposite ends of the series.

In the next group, representing 222 cases, the criteria for diagnosis comprised a venereal sore, a positive blood test, and glandular enlargement. Among the cases so recorded there were some in which the patients had been admitted with a chancroid that led to a suppurating bubo. Because a positive serum test was obtained the lesion was then regarded as a chancre and the bubo was apparently considered one of the signs of syphilis. In other cases which found their way into this group, it appears that the lesion was healing when seen by the medical officer, and dark field examination was negative, but the serum test was positive, was confirmed by subsequent tests, and general glandular enlargement was noted. One has no doubt that such were really cases of syphilis.

The additional presence of skin or mucous membrane lesions makes the diagnosis presumptively correct. One would expect such evidence to be recorded if the skin and mucous membranes are affected, but unfortunately failure to mention such lesions can not be taken to indicate that they were not present.

Theoretically, in cases where the *Treponema pallidum* was reported to have been found by dark-field examination, the diagnosis can be regarded as having been firmly established, and in most cases, perhaps, the causative agent of syphilis was present when the examination was reported positive. It was necessary for the reviewer, however, to bear in mind the possibility that other microorganisms might have been mistaken for *Treponema pallidum*. Certainly one could feel more certain that the patient really had syphilis when the recorded positive result of dark-field illumination was supported later by a positive blood serum test.

Diagnoses based on clinical manifestations alone might well be erroneous in many instances. Many of them were made on small ships or at isolated stations where laboratory facilities were not available, so a diagnosis without them should not be criticized. The subsequent history, in many of these cases, showed the correctness of the original diagnosis. Unfortunately some of them were made in places where laboratory confirmation was possible and, regardless of the medical officer's judgment and experience, it does not seem fair to the patient not to use laboratory facilities, if available, before making so serious an entry in his record. No justification can be seen for making a diagnosis on a "typical chancre" as was done in the small group noted. It is at least questionable whether the damage that may be done by a possibly erroneous entry of syphilis is offset by the advantage of beginning treatment very early.

Cases recognized after the stage of the chancre include those in which the patient was under observation for some other illness and

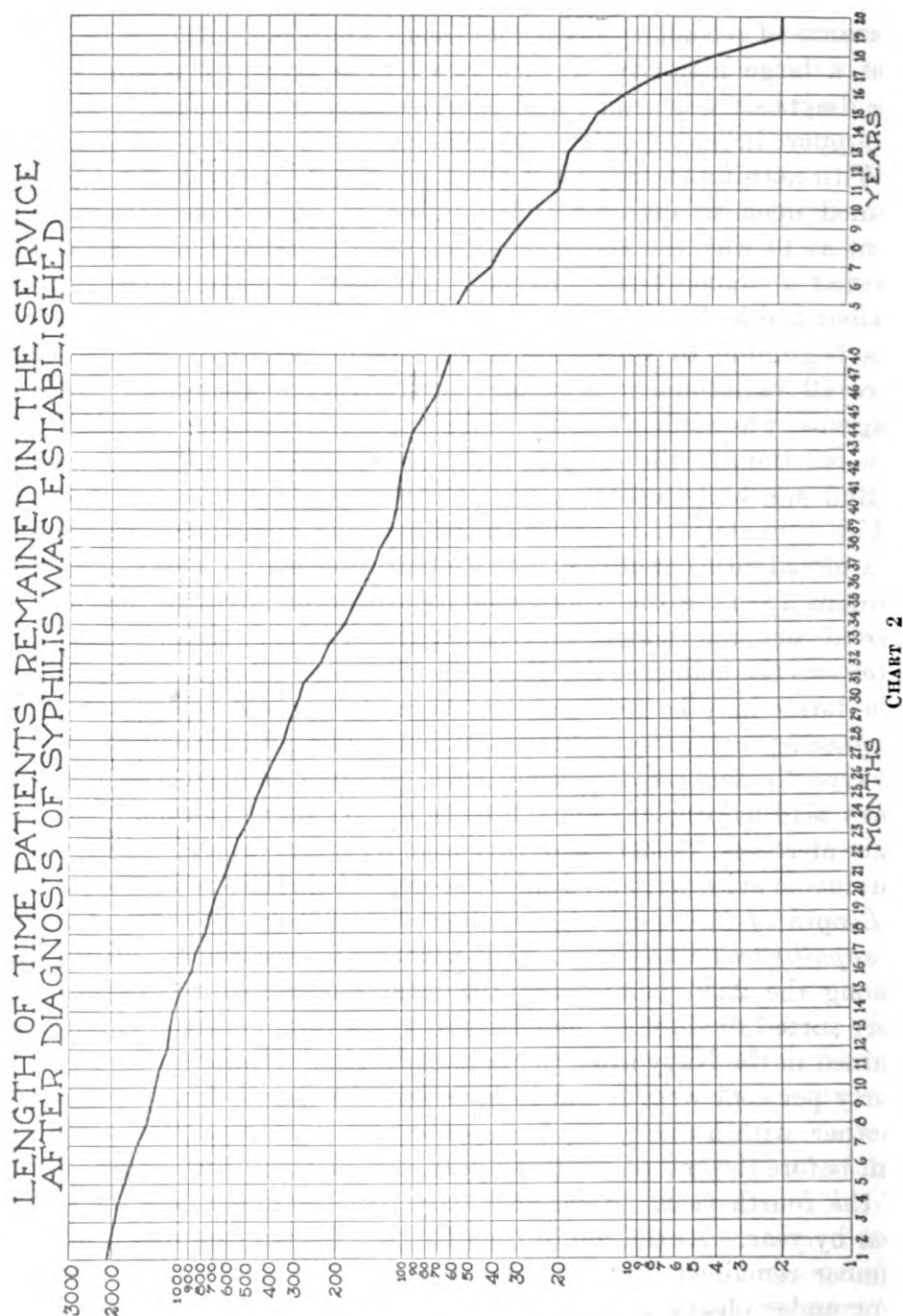
syphilis was found to be part of the picture; cases in which the primary lesion had been concealed; and those in which a history of primary syphilis was not obtainable for various reasons. In some cases, the first indication of infection appears to have been the appearance of secondary manifestations. The health records indicated that a large majority of such cases were carefully studied before the diagnosis was made, and there seemed to be sufficient evidence to support it.

With nothing to support it but a positive serum test, the diagnosis seemed open to question. A number of records contained statement as to why the test was done. Others stated that the man requested a "blood test." In such instances, it is probable that the patient had had some venereal condition which he had concealed and was beginning to worry about it. As in the other groups, there were all variations with respect to study and observation before a diagnosis was made, from the unaccounted for, single, one-plus, positive reaction, to the several confirmatory positive tests one expects to find in a well-studied case.

Unfortunately the seriousness of entering a diagnosis of syphilis in a record does not always seem to be appreciated. The yellow sheet remains a part of the record and, regardless of any subsequent negative history, the thought may be suggested to the medical officer who later sees the man that the diagnosis was made after due deliberation. The latter may be too ready to trace the present symptoms to the supposed previous syphilitic infection. The protean manifestations of syphilis and the frequency with which it is encountered in the Navy lead us properly enough to be always on the alert to detect it. This alertness, if not held in check by very careful study of all obtainable evidence, may lead us to make unjustified diagnoses.

Length of time patients remained in the Navy after the diagnosis of syphilis was established.—The 2,090 health records of **enlisted men** among the 2,267 comprising the total number of records studied, were sorted to show by months and years how long the patients remained in the Navy after the date of original admission for syphilis. Forty per cent were found to have left the service for one reason or another within one year, 74.6 per cent within two years, 92.1 per cent before the end of the third year, and 97.1 per cent before the end of the fourth year. After that only small numbers left the service year by year. At the end of the fifth year 2.6 per cent of the original number remained in the service and could, theoretically, have been kept under observation for that length of time. At the end of the tenth year 1.2 per cent remained, and at the end of the fifteenth year only 0.6 per cent. No one of the patients was in the service 20 years after he contracted syphilis.

Chart No. 2 is presented to show by months, through the first four years, and after that by years, the diminishing numbers of the 2,090 patients comprising the total whose records were studied, who



could possibly have remained under treatment and observation. As might be expected, the patients completed their terms of enlistment or left the service for some other reason gradually at a rate that was

quite constant. The semilogarithmic scale makes this clear, since in such a chart a number which continues to diminish by a constant percentage gives a straight descending line instead of a curve. The actual numbers of men remaining at the end of each time period may be read directly from the scale.

The data, in general, emphasize the importance of establishing the diagnosis as promptly as conditions and diagnostic aids permit, and of beginning as soon as possible what, according to present knowledge, is regarded as an adequate course of treatment. The health records showed that many of the men had served through most of an enlistment period before contracting syphilis. While the point might be made that the Navy is not responsible for the man's future treatment, it is nevertheless true that essential service conditions may have been, at least in part, the reason why he became infected. If the records reviewed were fairly representative, it may be assumed that only 60 per cent of Navy syphilis cases can be kept under observation for as long as 12 months, only 25 per cent for two years, and less than 10 per cent for three years. It should be remembered that during the period in which most of the men included in this study contracted syphilis, short terms of enlistment were very common.

In view of the probability that many syphilitic patients will leave the service in a few months from the time the diagnosis is made, the question arises whether this does not, to a certain extent, justify more intensive treatment than would otherwise be given. It would seem more logical to plan treatment generally without giving great weight to the probability that the patient will shortly leave the service. The hazards of the disease and the hazards of treatment should be carefully weighed in all cases.

Conclusions regarding treatment recorded in the health records reviewed.—The treatment as recorded in the different health records varied greatly with respect to amounts of drugs administered, numbers of doses, duration of treatment, and intervals during which apparently no treatment was given. It was not practicable to summarize the treatment in a manner that would make such comparison possible as can usually be made with data that lend themselves to statistical analysis. It is therefore necessary to discuss certain general impressions formed by the writer while reviewing the records.

An attempt was made arbitrarily to divide the treatment in all cases into courses of arsenical and mercurial preparations with rest periods between. It was found in trying to fit the facts to the form of classification that courses of arsenic would vary from 1 to 15 or more doses. There were even greater variations with mercury. Likewise, with regard to rest periods there was no uniformity. As a matter of fact, in many instances, if periods intervening between

dates on which treatment was administered were considered as "rest periods," the intervals were so long that one would be equally justified in considering that treatment had not been intentionally discontinued for the time being, but had been neglected. As a rule, doses of arsenic were given a week apart. Intervals between doses of mercury appeared to depend principally upon the preparation used. In most series, the doses of an arsenical compound were graduated. That is, the initial dose as recorded was small, and succeeding doses were larger and larger up to the amount usually considered a full dose. In 35 per cent of all courses of neoarsphenamine, all doses administered, including the first, were 0.9 gram.

It appeared that medical officers generally depended upon arsenic to check the disease. The administration of mercury was apparently subordinated. In many cases, a course of arsenic was given without any mercury, but the reverse was seldom noted.

It was interesting to observe how well the great change that has occurred in the practice of treating syphilis with arsphenamine and neoarsphenamine, during the time these drugs have been in use, was reflected by the health records. Men who were admitted to the sick list in the days when salvarsan was first coming into use, were given a single or, at most, two doses and then mercury was administered over a long period. In later years, the general practice seemed to run to the administration of a number of doses of an arsenical preparation, and mercury over a period which was rarely longer than two months, after which there ensued a period without treatment of any kind. As a general rule, directly after the diagnosis of syphilis was established, an intensive course of treatment was given, but after that, in many instances, interest in the case apparently waned. On the whole, one could hardly avoid the conclusion that patients were not kept under medical observation continuously or long enough, and that follow-up treatment was neglected. About two-thirds of the patients received two or less than two courses of treatment. The number of courses in the other third of the cases varied from three to seven. In 60 per cent of the cases in which follow-up treatment was given, the intervals between courses were longer than two months.

It should be remarked that inadequate treatment is due, not nearly so often to lack of interest or poor judgment on the part of medical officers, as to a number of causes, including certain essential service conditions as well as the tendency on the part of many patients to discontinue treatment upon the slightest provocation and to take advantage of every change of medical officers, or change in duty, to avoid treatment. In spite of the yellow abstract in the health records of men who have been admitted with syphilis, it is not always easy to follow up all cases when turnover of men within the service is great.

In a majority of the cases in which too little treatment seemed to have been given, the health records naturally did not make it apparent why more treatment had not been given. Forty-four per cent of the men who were assumed not to have received sufficient treatment remained in the Navy more than a year after the diagnosis was established.

In only a small number of such cases the men were serving on board vessels without medical officers or at isolated stations where they could not have been observed by a medical officer for considerable periods of time. A few records contained statements to the effect that the patient would not cooperate or had refused treatment. In such cases one might well doubt whether the man had been convinced that the diagnosis was correct and that it was necessary to submit to prolonged treatment. Of course, pain attending injections of arsenic or mercury already administered may have been a factor in certain cases, and other men may have feared possible accidents incidental to treatment, especially when the dangers were magnified through scuttlebutt rumors. In many cases, however, the records suggested that a negative blood test having been obtained after a course of injections, treatment was discontinued, and was resumed only because a positive test was later obtained. In some cases it appeared that the need of further treatment was not recognized until after the man was transferred and had come under the observation of another medical officer. In many cases where the first course of treatment was administered in a naval hospital, the patient having been returned to duty with a recommendation that further treatment be given after a specified time, the records failed to show that treatment was followed up.

In so far as one may judge from studying these health records, some medical officers apparently make little effort to see that all men with a history of syphilis attached to their organizations are properly followed up, but others are very careful, and even though no drugs may have been administered over a comparatively long period of time, entries showing that negative blood tests were found indicate that the case was not neglected. It was of interest to the Bureau of Medicine and Surgery to note the names of medical officers attached to the various records, although reference to names has no place in this discussion.

It is appreciated, of course, that ideas regarding indications for treatment may honestly differ a good deal and that the medical officer responsible for the man's health may have been governed by a number of conditions not mentioned in the health record. From the standpoint of therapeutics alone, one medical officer may consider that a second course of intravenous medication should be

given after one month, regardless of the serum reaction, while another may deem it good practice to wait three months before giving more treatment, and a third may consider that treatment is not being neglected so long as the serum test remains negative. There is obviously much need for more general agreement of ideas regarding what constitutes sufficient treatment in usual and unusual cases of syphilis, but that is a phase of the subject which should not enter into this discussion.

In general, following the progress of cases by serum tests was badly neglected, or else the results of tests were not entered in the records. In many cases no test was mentioned after the diagnosis was recorded. Many patients were allowed to go for two or three years without any treatment or test, so far as could be ascertained from entries in the health record. In no case had sufficient time elapsed after a positive serum test to justify the assumption that a cure had been effected. In passing it should be noted that the health records of men who had contracted syphilis several years before only found their way into the series because the cases had become sufficiently active to warrant placing the men on the sick list again. One should not lose sight of the probability that there are men in the service, infected many years ago, in whose cases the disease was arrested if, indeed, they were not cured. Such cases were not reviewed because of the conditions under which the health records of syphilitic patients were traced. To this extent the records studied do not represent fair random sampling of cases in which infection occurred prior to 1922. This, however, does not invalidate conclusions other than those relating to criteria of cure.

Entries showing that spinal fluid was tested were made more frequently in recent years. The frequency with which such tests suggested involvement of the central nervous system before clinical manifestations of neuro-syphilis were discovered, would seem to indicate that the spinal fluid should be tested more often than it has been even in recent years.

In 91 cases, so far as the records showed, no treatment was administered. In 64 of these cases, papers on file with the health records indicated that the men had reenlisted and were in the service when the records were reviewed. It is possible that some treatment had been given and had been entered on the yellow syphilitic abstract which was not available. The practice is, of course, to transfer the abstract to the new health record upon reenlistment, all medical history sheets remaining in the files of the Bureau of Medicine and Surgery. It is obvious that unless medical officers have entered all information about the case, and made a record of all treatment in medical history sheets as well as upon the abstract, it is impossible to obtain the complete history in the case of a man who has reenlisted.

The records, therefore, are not of as much use for purposes of statistical study as one might expect them to be. If it is the desire of the Bureau of Medicine and Surgery to keep itself better informed as to the kind of treatment that is being administered, a change in the system of recording is necessary.

In 10 cases the patients left the Navy within a month after the diagnosis was made. One man was transferred to hospital, where an entry was made in his health record to the effect that the diagnosis of syphilis was erroneous; but the diagnosis was not changed, the man was discharged to duty, and he left the service within a month. Two men deserted shortly after the diagnosis was made. Three were reported to have refused treatment entirely, but no reason for refusal was stated. Four men were found to have syphilis just before their terms of enlistment expired, and were recorded as having been discharged untreated with the disease in an active stage. Eleven men served from 2 to 8 months; 4 from 12 to 24 months; and 2 from 24 to 36 months after admission with syphilis without record of any treatment, and with no entry to show why treatment had not been given. It is difficult to understand why any medical officer should permit a health record to pass from his care without seeing that all necessary entries have been made.

With a view to forming some idea of the kind and extent of treatment given syphilitic patients in the Navy, the cases were divided into groups according to length of time the men remained in the service after original admission to the sick list with syphilis. Many of the records contained so little data referring to treatment that it was a question whether to include them. The reviewer concluded that a better idea of the way in which syphilis is generally treated in the Navy could be had by studying only records in which the details of treatment were quite fully recorded. He realizes that such selection of cases may be open to criticism. Nevertheless the data thus assembled seem to convey a good deal of information, and the records eliminated would have furnished little or none. There were so few cases in which treatment extended over a period longer than four years that it was not considered worth while to tabulate them.

The results of this inquiry regarding treatment are shown in Table No. 7.

TABLE No. 7.—Summary of recorded treatment in selected groups of cases

Arsenic				Mercury																	
Number of doses			Amount given		Salicylate			Succinimid			Bichloride			Oxycyanide							
Minimum	Maximum	Mode	Minimum	Maximum	Mode	Number of cases	Minimum amount	Maximum amount	Mode amount	Number of cases	Minimum amount	Maximum amount	Mode amount	Number of cases	Minimum amount	Maximum amount	Mode amount	Inunction	By mouth	None	Number of cases complicated
Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.				
2	12	8	1.0	10.5	3.0	34	2	10	8	8	1	1½	8½	5	6	2½	4	2	1	4	5
2	14	6	1.5	11.0	3.5	25	3	24	8	25	7	2½	9	5	6	3½	4½	2	0	6	4
3	10	8	2.5	9.5	7.0	33	2	38	8	7	1	7	7	3	4	3½	6	0	5	4	14
32	6	19	3.5	14.0	11.0	23	2	23	20	4	6	1½	4	3	1	1½	13	0	0	1	1
15	8	24	6.0	17.5	9.0	12	9	30	20	9½	0	2½	9½	0	0	0	0	0	0	0	0
2	20	20	11.1	14.2		2	20	24		0	0	0	0	0	0	0	0	0	0	0	14
602																					
23	3	9	1.5	7.5	4.5	10	2½	13	7	6	2	5	6	0	3	4	12	0	4	4	14
21	8	20	5.0	14.5	8.5	16	2	23	20	4	2	4	4	0	0	4	0	0	0	0	1
31	8	26	3.0	20.5	17.0	30	6	30	30	4	6	2	4	3½	2	4	0	0	0	1	0
25	12	33	8.5	22.5	18.5	23	4	41	30	4	2	4	2	3	1	2½	2½	2	1	0	0
256																					
14	4	9	3.5	7.0	5.0	7	3	16	8	5½	0	2	5½	3	0	4	0	0	4	0	0
8	11	17	7.5	14.5	10.5	2	16	19	2	15	0	4½	14.5	0	0	0	0	0	4	0	0
3	13	27	9.0	22.5	18.0	13	6	30	24	16	9	½	15	3	0	3	12	0	1	0	0
11	15	38	11.0	28.0	11.0	10	6	48		1½	1	1½	13	1	0	4	4	2	1	1	5
60																					
20	7		6.3			0					0			3	0			0	1	0	0
1	1		6.3			1					2		5	0	1		8	1	0	0	1
4	6		5.4	16.5		6	6				3	3½		0	0			3	0	0	0
2	20		20.5	20.5		8	10	29		4	4	4	6	0	0			2	0	0	0
3	24		9.0	20.5																	
4	17		9.0	20.5																	

Only the data for neoarsphenamine and mercury in various forms were tabulated. Arsphenamine was used in such a small number of cases it seemed unnecessary to extend the table to include the additional columns necessary to show the different size doses given. A similar statement applies to bismuth. So far as the place now occupied by arsphenamine in the treatment of syphilis is concerned, it is believed data compiled by the Bureau of Medicine and Surgery from monthly venereal disease reports afford more information than could be obtained from analysis of data taken from these records. It may be said that neoarsphenamine, and several compounds of mercury, accounted for so large a proportion of the total number of doses of all drugs administered that the table fairly represents the treatment as given in the series of cases studied.

It should be stated that no patient appeared to have received more than four separate courses of treatment even in the group where the patients remained in the Navy as long as four years after the diagnosis was established. In general, it appeared that men who remained in the service for the shorter periods received almost as much antisymphilitic medication as those who remained from three to four years.

As a rule, a course of neoarsphenamine consisted of six to eight injections, making a total of 3.5 to 5 grams. Almost all of the patients received salicylate of mercury as well as neoarsphenamine. The use of the insoluble salicylate, almost to the exclusion of soluble salts of mercury, is noteworthy. In a considerable number of cases, neither mercury nor any other drug was used besides neoarsphenamine.

If Table No. 7 fairly represents practice among medical officers of the Navy, it would appear with regard to a group of syphilitic patients with about two years to serve after becoming infected, that approximately 25 per cent would receive one course of treatment consisting of about eight injections of neoarsphenamine, and about the same number of doses of mercury in some form. About 50 per cent of these patients receiving the arsenical compound would also be given salicylate of mercury; about 25 per cent would receive a soluble salt, oxycyanide or succinimid; about 12.5 per cent would take mercury by mouth; and about 12.5 per cent would not be given any mercury.

While Table No. 7, perhaps, does not fairly indicate the plan of treatment followed by the majority of medical officers at the present time, it does show that a considerable percentage of the patients whose records were reviewed did not receive treatment that could be regarded as adequate then or now. In view of the findings in this series, it would seem desirable for the Bureau of Medicine and Surgery to check up on treatment from time to time.

The records of 32 men who remained in the service more than four years after the date of first admission to the sick list with syphilis were not included in making up Table No. 7. Only 1 continued on active duty 14 years. Of the 32, only seven received more than four courses of treatment, and the greatest number of courses was seven. In several cases only two courses were given. In all cases the records indicated that there had been intervals of from 1 to 10 years without medication or other attention.

Some of the patients seem to have been well treated in the beginning, only to be forgotten for a number of years, after which they were treated for a time and again forgotten. Others apparently were kept under observation but were given treatment at irregular intervals. One man in the course of 10 years received only one dose of arsphenamine and some mercury, the amount of which was not definitely recorded. In none of the cases comprising this group was there evidence of systematic coordinated efforts on the part of the various medical officers of organizations to which the men were attached from time to time to cure them. The writer was impressed by the fact that increasing length of time during which cases could have been followed did not seem to carry with it corresponding increase in the amount of treatment given. Blood tests were not recorded at regular intervals. A number of reasons might be advanced against instituting any fixed system or method of treatment to be followed in all cases. Nevertheless, the writer holds the opinion, as a result of this study, that most of the patients would have had the benefit of more thorough treatment and more continuous observation had medical officers been required to conform at least to certain minimum standards regarding treatment, and especially follow-up treatment, based on continuous observation and the results of blood tests made at proper intervals.

Complicating diseases and conditions as noted in the 2,267 health records reviewed.—In Table No. 8 cases in which complications occurred are set forth in several groups according to length of time elapsing from the date of original admission for syphilis to the time when the complicating disease or condition developed.

TABLE NO. 8

	Number of cases	Died	Medical survey dis- charge	Im- proved	Recov- ered
0 to 3 months:					
Poison, neoarsphenamine, antisyphilitic.....	3	3			
Syphilitic meningitis.....	1	1			
Iritis.....	1				1
3 to 6 months:					
Syphilis of central nervous system.....	3		2	1	
Syphilis of bone (vertebra).....	1		1		

TABLE No. 8—Continued

	Number of cases	Died	Medical survey dis- charge	Im- proved	Recov- ered
6 to 12 months:					
Syphilis of central nervous system.....	8	-----	7	1	-----
Poison, neoarsphenamine, antisyphilitic.....	3	-----	2	-----	1
Iritis.....	2	-----	1	-----	1
Unneutralized arsphenamine.....	1	-----	-----	-----	1
12 to 24 months:					
Syphilis of central nervous system.....	9	-----	7	2	-----
Poison, neoarsphenamine, antisyphilitic.....	1	-----	1	-----	-----
Syphilis of structures of eye.....	4	-----	3	1	-----
24 to 36 months: No complications.					
36 to 48 months:					
Syphilis of central nervous system.....	3	-----	1	-----	2
Poison, neoarsphenamine, antisyphilitic.....	1	1	-----	-----	-----
Retinitis.....	1	-----	1	-----	-----
Locomotor ataxia.....	10	-----	10	-----	-----
General paresis.....	57	-----	57	-----	-----
Total.....	109	5	93	5	6

It will be noted that conditions arose in 109 cases which, for the purposes of this analysis, may be regarded as complications. In eight instances poisoning by neoarsphenamine was the complicating factor. In one case 0.6 gram of unneutralized arsphenamine was administered intravenously by mistake. The patient recovered.

Disregarding for the moment locomotor ataxia and general paresis, it may be said with respect to treatment that no remarkable differences were observed in the cases in which complications were recorded.

Eye complications were noted in eight cases. In three instances the eye became affected in the first year of the disease, in four during the second year, and one case of retinitis developed in the fourth year.

Lesions of the central nervous system accounted for more than half of the cases in which complications developed within 48 months after admissions for syphilis. Damage to the heart, blood vessels, or parenchymatous organs was not noted, but connection is not so likely to be traced between damage to those structures and the underlying syphilitic infection, as when the central nervous system is attacked.

Of the cases in which the central nervous system became involved, 2 were noted as having been cured, 1 terminated fatally, and 17 of the patients were invalidated from the service.

Locomotor ataxia.—One of the primary objects of the study was to determine, if possible, what conditions were associated with the development of locomotor ataxia and general paresis, but the data were so incomplete in most of the cases that little progress could be made in this direction. It should be borne in mind, too, that so many of the men infected with syphilis leave the Navy early in the course of the disease that the figures presented here can not be considered as indi-

cating the incidence of these sequelæ. Of course, no information could be obtained concerning men who had left the service.

The histories of 10 locomotor ataxia patients happened to be included among the health records selected. The cases were those of 2 officers, 4 chief petty officers, 2 seamen, and 2 marines. In 4 of the 10 cases syphilis was recognized in an early stage. Two of the 4 were treated principally with mercury for from two to three years. After that, one of the patients received no more treatment and had no blood test for nine years, when he again came under medical observation with symptoms of locomotor ataxia. In the other case there was an interval of four years during which no entry was made in the health record regarding treatment or serum test. As in the other case, symptoms referable to the spinal cord brought him to the attention of a medical officer.

In two other cases the early treatment had consisted of neoarsphenamine and mercury. One of the patients received 22 doses of neoarsphenamine and 43 doses of mercury over a period of four months, and manifestations of locomotor ataxia then appeared. The other patient received injections of neoarsphenamine and 20 doses of mercury during the 10 months which intervened after the diagnosis was made until he became tabetic.

In the remaining 6 of the 10 cases the health records contained no previous entry relative to syphilis. Three of the patients stated they had had chancres in the past for which they had not taken treatment, while the other three professed to have no knowledge of a possible primary lesion.

All 10 patients were invalided from the service or placed on the retired list. Apparently only two were in need of institutional care.

General paresis.—There were 57 cases of general paresis, divided as follows:

Officers	6
Chief petty officers.....	18
Petty officers.....	18
Seamen and firemen.....	9
Marines.....	6

In 39 cases the health records contained no entries relating to syphilis antedating the appearance of parietic symptoms, but in 6 of these the patients admitted having had a chancre before entering the Navy. Six others admitted having had venereal sores which they had concealed to avoid record, leaving 27 of the 39 in which no history referable to syphilis could be obtained. In only 18 of the cases, therefore, was there any recorded evidence of syphilis before symptoms of general paresis developed. In these cases the treatment which had been given in the early stages of syphilis was not remark-

ably different in extent or kind from that administered in many cases where paresis did not develop. It may be said, however, that the treatment as recorded can be characterized as irregular and lacking in system. Some of the patients who developed paresis a number of years after contracting syphilis had been treated intensively with mercury and iodides in the early stages of the disease. Others, who were not infected until after treatment with arsenic became general, had received arsphenamine in the early stages.

In 3 of the 57 cases of paresis syphilis had apparently been contracted through nonvenereal contact. Three of the patients were negroes; the others were white men. All of the patients were retired or discharged from the service after the diagnosis of paresis was established, and it was not practicable to determine subsequent progress.

In the 18 cases in which some history of syphilis had been previously recorded and in 12 cases in which the paretic patients gave histories of venereal sores, the times elapsing between the probable dates of initial lesions of syphilis and the appearance of paretic symptoms were as follows:

Interval between chancre and first paretic symptoms	Chancre diag- nosed in the Navy	Chancre prior to entry	Chancre after entry. Not recorded
1 year.....	2	0	0
3 years.....	1	3	0
5 years.....	4	0	2
7 years.....	1	0	0
8 years.....	3	0	0
9 years.....	3	1	0
10 years.....	2	1	0
14 years.....	2	1	1
20 years.....	0	0	3

This study seems to show a real need for more complete and more accurate recording of data relating to the diagnosis, treatment, and progress of syphilis in the Navy. Many patients fortunately pass from one thoughtful, painstaking medical officer to another. Others do not. Systematic observation and proper follow-up treatment probably can not be insured for all patients without some sort of clearing house to which case records, written according to a prescribed form with due regard for generally recognized criteria of diagnosis, treatment, and cure, are sent to be passed upon, and referred, in cases where additional treatment seems necessary, to the medical officer of the organization to which the man happens to be attached at the time. .

MEASURES OF OUTSTANDING IMPORTANCE IN THE PREVENTION AND CONTROL OF MALARIA

By M. A. STUART, Commander, Medical Corps, United States Navy

The epidemic of malaria reported at Olongapo emphasizes the danger present when the necessary factors making for the transfer of infection are operative.

While the total number of cases in this outbreak was comparatively small, it indicates what might have occurred had a large body of men been quartered under similar circumstances.

In this instance, mosquito vectors were present in sufficient numbers. Malaria was endemic, and later, after the arrival of the naval vessels, it became epidemic in a large native population group within mosquito-flight distance from the naval station. This led, as might have been expected, to an epidemic there.

Experience has frequently shown that where a number of persons have come from a nonmalarial territory to live near malaria carriers in the presence of anopheles mosquitoes, a similar result may be expected. This occurred at Mount Hope, Canal Zone, in 1908, when a battalion of approximately 450 marines arrived on the Isthmus from a United States port and were quartered in a large warehouse located a short distance from a native community of considerable size. The warehouse was not screened, but the men sleeping on cots were protected at night by bed nets. Malaria appeared on the eleventh day after arrival, and in the following eight days 61 cases developed. The subsequent history of this battalion, covering their return voyage to the United States and a short period after arrival, showed nearly every man to have been infected. Gorgas said in one of his papers:

Malaria in the tropics is by far the most important disease to which tropical populations are subject, either military or civil. While the percentage of fatalities is not nearly so great as from some other tropical diseases, the amount of incapacity caused by malaria is very much greater than that due to all other diseases combined.

Carter stated:

Prosperity is not compatible with the prevalence of malaria. That is true of few diseases. Take yellow fever. I would by no means belittle the damage it does, but it does not do the harm to the community that malaria does. Habana was a prosperous city with endemic yellow fever. New Orleans was prosperous with many epidemics. But I defy you to show me one single place, inhabited by white people, where malaria seriously prevails, which is prosperous. It does not exist.

In view of the sharp epidemic at Olongapo it may not be amiss to discuss briefly the measures that are chiefly of value in the prevention and control of malaria. This disease seems to be transmitted only by certain varieties of anopheles mosquitoes represented in

Panama by *A. albimanus*, *A. tarsimaculatus*, and *A. pseudopunctipennis*. *A. malefactor*, as its name indicates, has been under suspicion, but Darling states it could not be infected with malaria under the most favorable conditions.

In general, anopheles breed in the open. Smith (1904) states they will breed wherever they can find water, regardless of the size or kind of pool, and except that they do not occur in really foul liquids may be found wherever any other mosquito can breed. They have been discovered in pails, rain barrels, gutters, swamps, salt marshes, hoofprints, hollow trees, orange peels, tin cans, empty bottles, ditches, edges of running streams, or in any formation, natural or artificial, capable of holding water. *A. crucians* was found by Griffiths to breed in water diluted to slightly more than 50 per cent with average sea water.

According to Darling, observations and experiments have given the following data regarding some of the factors concerned in the transmission and prevention of malaria in the Canal Zone. He wrote:

In every malarial region it is important that the varieties of mosquitoes common to that region should be studied and a determination made of the species of anopheles hospitable to malaria and those transmitting it. The English observers, James, Christophus, and Stephens, noticed that certain species of anopheles were natural transmitters of malarial fever, while others were rarely, if ever, found infected naturally, although it would be possible to infect them under laboratory conditions. We know, too, that the breeding habits of anopheles vary considerably, and it may be said that there is as much selection of breeding places by anopheles as there is selection of feeding grounds by fish.

Trout, salmon, and bull-heads have their analogues among anopheles larvæ, some of the latter requiring fresh aerated water or water containing much green algæ. Others are found in tree holes and the recesses of epiphytic tree plants, such as bromelias, where they prey upon other species; while others preferring fresh, aerated water are so adaptable that they will flourish in sewage, streams, or in brackish water containing half its volume of sea water. Some species require an abundance of sunlight, while other sylvan species prefer shady pools in which chlorophyl-bearing algæ are relatively absent. The anophelines insusceptible to malaria may be more limited in their choice of breeding places, so that in the work of malarial mosquito destruction the latter may be disregarded and attention given wholly to the breeding places of those varieties responsible for the transmission of malarial fever.

The Report of the Health Department of the Panama Canal for 1922 states:

While small breeding places at a distance of 1 mile or more from a protected center may be disregarded with comparative safety, repeated observations on the Isthmus have demonstrated fully that from large breeding areas, such as swamps and cattle-tracked bogs, we may experience large invasions of mosquitoes of all classes, including *A. albimanus* and *A. tarsimaculatus*, over a distance of 2 miles or more, and that then even a stretch of open water 1 mile in width does not oppose an effective barrier.

The tendency for adult anopheles to fly toward a bright light, across the wind, and along low moist areas, such as ditches and swamps, should be borne in mind.

The methods used in the prevention and control of malarial fever on the Isthmus of Panama in converting a large section of territory that had been known for years as the "pesthole of the world" to one in which the white race may live with comparative freedom from malaria, may be classified as follows:

1. Elimination of breeding places.
2. Destruction of larvæ.
3. Destruction of adult mosquitoes.
4. Protection of persons from mosquitoes.
5. Segregation of nonimmunes from unprotected native villages.
6. Medicinal prophylaxis by the routine use of quinine.

Elimination of breeding places.—Filling of all places holding collections of water such as pits, marshes, gulleys, etc., will permanently remove them as potential breeding places, but this has limited application on account of the expense usually involved.

Drainage may often be employed with success, depending upon the magnitude of the work required and the number of men available. Simple ditches, constructed with a constant pitch and a smooth bottom to prevent standing water at time when the flow is nil, are often efficient. These may be cleared of vegetation when necessary by burning. A fire is started to windward at the end of the ditch and kept burning by spraying oil upon the grass to leeward and slightly in advance of the fire. When the sides and borders of ditches are burned in this way and then treated frequently by oil sprays or mops saturated with crude or old crank-case oil, vegetation does not grow for a long time, and the sides of the ditch do not become easily eroded by the washing from heavy rains.

The method of clearing ditches by burning reduces materially the expenditure of labor that would be involved in removing dense tropical vegetation by cutting. The cost of the oil is more than offset and, besides, a ditch that has been thoroughly burned usually remains clear for more than two months, whereas similar ditches cleared by cutting are likely to be found overgrown and obstructed at the end of that time.

Another form of ditch is one dug 2 to 3 feet below the surface and filled with crushed rock or large gravel. A more efficient form, and one used extensively on the Isthmus at present, is a trench of the same size but having an installation of 6 or 8 inch concrete tiles laid with the top of the tile 2 feet below the surface. Such a drain is then filled to the ground level with crushed rock, large gravel, palm fronds, or guinea grass, to allow for seepage of surface water.

It is probable that root growth will not interfere with tile so laid for a long period of time.

Open concrete drains have been used, but on the Isthmus it was found that extraneous matter falling into them would, at times, form dams and cause small pools of standing water, thus requiring constant supervision. Drains of this type are now being covered with concrete slabs to obviate this difficulty.

All vegetation should be cleared and kept closely cut, as it acts as a protection to adult mosquitoes during the daytime, and obscures small collections of standing water and containers of all kinds that might hold sufficient water for breeding purposes. It has been noted that such sanitary measures carried out over a radius of 1 mile from living quarters reduce the incidence of malaria to practically nothing.

Destruction of larvæ.—This may be accomplished by the use of oil, so as to form a surface film that cuts off the air supply of the larvæ, by larvicides, and by the use of fish, usually top minnows, known to feed upon larvæ.

Oil is generally used in the form of crude or fuel oil, and should not be heavier than 38° Baumé (American standard). Lately, with the extensive use of automobiles, old crank-case oil has also been used. Filming of the oil, if imperfect, may be increased by the addition of kerosene.

This may be applied crudely, in an emergency, by the use of an ordinary garden sprinkling can, but this method is not very efficient. Drip cans suspended over flowing ditches or small streams have been extensively used. Any tin container can be used for this purpose. A hole should be made about 3 inches above the bottom, and a wick inserted, and so adjusted as to deliver a constant drip of oil to the center of the ditch or stream. This method is now obsolete on the Isthmus, as it was found difficult to adjust the flow of oil. It was noted that the oil, instead of filming out, tended to float down the center of the stream. Another method found useful in some instances was to anchor a large handful of waste saturated with oil in a ditch or drain.

It was discovered that the addition of a larvicide to crude oil to thin it sufficiently for use in sprays destroyed the filming tendency of the oil. Investigation disclosed the fact that any soapy substance impaired, or practically destroyed, the filming property of oils.

By heating crude oil to a temperature of about 150° F. in a small tank and transferring it to a pump tank or barrel placed in a row boat, and spraying while still hot, an excellent spray or mist of oil can easily be obtained. The mist falls upon the water, and immediately spreads into a perfect film when not obstructed by vegetation

or débris. According to recent reports from the Canal Zone, this method gave excellent results in grass-grown shallows. When directly sprayed lightly at a high angle to allow the oil particles to fall almost vertically, a satisfactory covering was secured. In shallows so treated it was found unnecessary to keep the grass constantly cut from the margins of lakes or pools.

Mud flats or soft areas incapable of sustaining the weight of a man, may be treated by throwing waste saturated with oil at intervals on the mud.

Larvicides.—Crude carbolic acid when made into a soap with common resin or alkali, yields a larvicide having excellent diffusing and toxic properties. This forms a milky emulsion with water that is very destructive to mosquito larvæ. It acts by effecting an entrance into the respiratory tubes, not only of the larvæ, but also of the usually resistant pupæ, with rapidly fatal results.

Paris green in a 25 per cent mixture with hydrated lime or powdered soapstone, gave good results against anopheles at Quantico, Va., when dusted over large areas from an airplane at a height of 100 feet or less with a wind velocity of less than 4 miles per hour. At greater heights and wind velocity, a 50 per cent mixture was necessary. Other varieties of mosquitoes were, however, not affected.

Barber and Hayne (1921) following extensive experiments in both laboratory and field with Paris green, noted:

The following kinds of breeding places have been successfully treated. Impounded water with larvæ protected by floating wood; cold water in a ditch immediately below a spring, the larvæ being protected by thick water cress; grass-covered ponds and those covered by myriophyllum; ground below a spring and covered with thin layer of water; wet pasture with breeding in cow tracks; an old ditch, the water of which was covered with duckweed and partly protected by overhanging weeds; various small pools without any particular covering. In small pools a few pinches of the diluted Paris green sufficed to destroy the larvæ. The species of anopheline apparently makes no difference as regards their resistance to this poison.

Paris green in antianopheline work should be diluted with a large proportion of inert dust. Only very small doses are necessary to poison larvæ, and the dilution enables one to spread a relatively small quantity of the poison over a large surface. Furthermore, any risk of poisoning the operator or consumers of the water treated is minimized by the use of the diluted dust. As a diluent we have successfully used fine sand, rotten wood dust, and road dust. Road dust, preferably mixed with some fine clay, seems to be as effective as any. The addition of weight in the form of some coarse sand is helpful in enabling one to direct the dispersal of the lighter dust. Some of the diluting dust sinks on contact with the water, but most of the arsenic is left on the surface. Flowers of sulphur has not proved a suitable diluting dust. A dilution of about 1 part of the poison to 100 parts of the inert dust seems to be a favorable mixture.

A slowly settling cloud of dust carried along by a light wind is apparently the best agent for the distribution of the dust, and the main thing is to

start this cloud in the right place and direction. A single cloud may destroy larvæ over a wide area and at a considerable distance from the operator. We have tried certain mechanical means for distributing the dust, such as dust guns used in dusting arsenic on cotton plants, but thus far we have succeeded best by simply throwing the dust into the air by hand. The cloud can thus be formed high or low, to the right or to the left, depending on the force and direction of the wind.

The best results are to be expected on a sunny day when the powder is spread after the sun is well up and the dew has disappeared from any vegetation covering the breeding place.

The use of a powder instead of a liquid should greatly lower the cost of transportation. Usually a dust suitable for dilution can be found in the neighborhood of the breeding place, so that one has to transport only a pound or so of Paris green for the treatment of a large area.

In antianopheline work where such small quantities of highly diluted Paris green are used, and where the work is wholly out of doors, simple precautions suffice to protect the user. It is well to remember that one is working with a poison and that some precautions should be taken, at least until the matter is further investigated. It is probably sufficient to keep to the windward of the dust clouds and to avoid inhaling the dust as far as possible. In case a great deal of exposure is necessary, one should use some precaution to keep any large amount of Paris green from entering the clothing or accumulating anywhere on the skin.

Darling found that copper sulphate, while efficient as an algicide in dilutions up to 1 part in 500,000, is not destructive to larvæ in dilutions greater than 1 in 50,000.

Sodium arsenite in a 0.125 per cent solution is a valuable agent in destroying gross vegetable matter, such as grass, and is also effective as a larvicide. In pools not having outlets, such as are used for ornamental purposes, sodium arsenite is of considerable value in destroying grass, algæ and larvæ, and will continue to be efficient until washed or drained out.

Niter cake has been found to kill larvæ when used in the concentration of three pounds to a barrel of water.

Sea water has been advocated as a larvicide, but Darling, working with the mosquitoes of the Canal Zone, observed the effect of salt and sea water on anopheles larvæ, and says:

In general, the effect of an irritating, toxic, or otherwise unusual fluid on mosquito larvæ is to hasten pupation. A number of experiments were tried with sea water, salt water, and solutions of the heavy metals, and in most instances, in the more concentrated solutions, when the larvæ were not killed within 24 hours, they pupated, and occasionally the period of pupation was shortened; so that if, for instance, sea water were used as a larvicide, the first effect would be to hasten pupation, and thus increase the number of anopheles in a district, and if later the sea water became diluted by rain, several species of malaria-transmitting anopheles might breed in it without difficulty, notably *A. albimanus* and *A. tarsimaculatus*. On this account sea water could not be used with any degree of success as a larvicide for anophelines, except in large quantities and in certain locations.

According to Howard, Dyar, and Knab, the proposed destruction of anopheles by the introduction of sea water does not seem to be rational, at least with certain species. At all events, the specific identity of the anopheles concerned must be taken into account. It appears certain that while some species may breed either in fresh or brackish waters, others may occur exclusively in saline water, and still others only in fresh water. (Griffitts, 1921.)

Certain kinds of small fish of the Cyprinodontidae and Poeciliidae families feed upon larvæ and have been used where oil and larvicides were objectionable, but their efficiency is reduced in the presence of abundant plant life or dense masses of algæ.

Peterson and Walker report excellent results at St. Thomas through the use of the guppy, *Lebistes reticulatus*, commonly called the "million fish." They have used them extensively in aquaria, lily ponds, rain barrels, cisterns, etc., and state that breeding of mosquitoes was prevented when such collections of water were well stocked with fish.

Butler and Peterson, observing the mosquito-destroying fish (*Poecilia sphenops* and *Gambusia dominicensis*) in Haiti, state that in a certain number of springs containing luxuriant aquatic vegetation both fish and mosquito larvæ lived happily together.

Fish have been used rather extensively in some of the Southern States, in recent years, for the destruction of mosquito larvæ in ditches, pools, swamps, and larger bodies of water with apparently good results, when properly employed.

Many observations were made by S. F. Hildebrand of the United States Bureau of Fisheries. It is believed that the results of his studies, in some detail, will be both interesting and useful.

He found that *Gambusia affinis*, *Heterandria formosa*, *Fundulus notti*, and *Fundulus notatus*, belonging to the minnow family Poeciliidae, inhabiting the Southern States, are of more or less value in eradicating mosquito larvæ and pupæ.

Of these, the *Gambusia affinis* appeared to be the most suitable for antimosquito work, and is the most important natural enemy of the immature mosquito. It is extensively distributed and lives under a wider range of conditions, probably, than any other American fish. It inhabits all kinds of sluggish and standing water, whether fresh or brackish, clear or muddy, deep or shallow, and while frequenting deep water, when large predatory fish are absent, it shows a distinct preference for shallow water. They are frequently seen in water too shallow completely to cover the body. It thrives in ponds visited by cattle, horses, and hogs, in weak to moderately strong sewerage, in open water, and that which is overgrown with vegetation. It withstands a small amount of chemical pollution, even when the concentration is sufficient to kill such hardy species as the common fresh-

water eel, the mudfish, and the catfishes. It, however, has been killed in a chemical pollution, particularly acids, that permitted the development of such species of mosquitos as *Anopheles crucians*, *Aedes sollicitans*, and *Culex*. This fish has been introduced into cisterns, water tanks, potholes, barrels, and aquaria, where it has lived for long periods of time, but, it has been reported, it will not live in metal tanks or cisterns, nor in water taken from them.

Gambusia affinis reproduces very rapidly and is viviparous. The eggs are fertilized and hatch within the body of the female. They are born alive and well developed. The young fish have been observed to attack and devour small mosquito larvæ when 24 hours old. It feeds at the surface of the water and lives most of the time in such localities as are favored by mosquito larvæ. That they are excellent feeders is known from observation. On one occasion a large female ingested 225 large immature mosquitoes, of which about one-third were pupæ, within an hour. These fish readily seize upon moving objects, apparently by instinct, while quiet motionless objects, even larvæ, remain unnoticed. Their sense of smell is deficient, and they are apparently unable to see at night. It is probable that shifting of larvæ across open areas of water containing *Gambusia* occurs at night. When mosquito larvæ are plentiful, they ingest the large larvæ and pupæ first. The presence, therefore, of small larvæ in waters inhabited by top minnows is not unusual, and their presence is considered merely as showing that mosquitoes are breeding; but unless large larvæ and pupæ also are found, no production is taking place and mosquito control prevails.

When fish are used in the control of mosquitoes, it is necessary at all times to study the local conditions. While top minnows can, at times, live under unfavorable influences, conditions may arise that will not only remove the fish but also permit the development of mosquitoes.

During his experiments in the field, Hildebrand noted that when copper sulphate was used in concentration to kill all the fish, it left the mosquito larvæ unaffected. A southern city at one time treated all the catch basins of its street drainage system with oil to prevent mosquito breeding. This oil was carried into a drainage ditch outside the city where it was mixed with sewage. Top minnows surviving in the combination of sewage and oil kept the ditch free of mosquito larvæ. A few years later, the city substituted a larvicide (a commercial disinfectant) for the oil, in treating the catch basins, with the result that the minnows were seen only occasionally in the ditch and remained in places where cleaner water entered either from side ditches or from seepage. The combined pollution of sewage and larvicide, although too great for fish to endure, was not sufficient to prevent culicines from breeding.

Those types of plants which have partly or slightly submerged leaves, or other parts, are the principal ones that furnish protection for immature mosquitoes against fish. The partly or slightly submerged parts of plants provide places where only a film of water is present. A film of such depth that it will cover a mosquito larva is sufficient for its welfare. It is, however, practically out of sight, and, because of the shallowness of the water, also out of reach of the fish.

When the water level is raised sufficiently to submerge all vegetation, mosquito breeding is usually completely eliminated in the presence of fish, until readjustment takes place. In areas stocked with *Gambusia*, but supporting protective types of vegetation, a constant water level is conducive to a maximum amount of mosquito breeding.

When algæ are first formed into mats and are still bright and green they are very favorable to mosquito breeding, but when the mats become older, darker in color, and begin to give up bubbles, they appear to be much less favorable and are rather infrequently inhabited by anopheles.

Destruction of adult mosquitoes.—Ronald Ross estimates that only 1 out of 24 anophelines manages to bite a human being, and probably less than 25 per cent of these become vectors. Roughly considered, then, we may look upon 1 out of every 100 female anophelines in a malarial country as a possible infecting agent.

The Report of the Health Department of the Panama Canal, 1925, states:

Fortunately it is not necessary to eliminate the last disease-bearing mosquito, or the last human carrier of mosquito-borne parasites, in order to prevent or practically prevent the spread of mosquito-borne diseases. Out of each 100 anopheles mosquitoes, if malaria is relatively scarce, only a few will have a chance to bite a patient during the period in which his blood contains malarial parasites in the infective stage. Of those which do so bite, only a limited number will live the 12 days necessary for the malarial organism to reach its full development in the insect, and of these some may die before they have an opportunity to bite a susceptible person.

It has been shown by Darling, Mitzman, and others that the bite of a single anopheles can cause malarial fever, also that a single mosquito can effect more than one person. This is being further substantiated at the present time in the artificial production of malaria by infected mosquitoes as a therapeutic measure in syphilitic infections involving the central nervous system.

Under most circumstances persistent, thorough methods for the daily capture of adult female mosquitoes in human habitations constitute a very important measure in malarial control. This method has been used for some time in the Canal Zone with marked success in areas where temporary camps were established, and it

was not practicable to carry out extensive sanitary measures. It has the further advantage of obtaining adult mosquitoes for the purpose of identification, and examination to determine the number of mosquitoes infected.

Le Prince stated:

In 1908 a temporary laborer's camp, consisting of tents, was established near the site of the present Miraflores Locks and was used for four and a half months during the rainy season when malaria transmission is most frequent. This camp was completely surrounded by extensive untreated anopheles breeding places. A laborer with a fly swatter and catching tube was employed to destroy all the anopheles he could find in the tents. Each tent was examined soon after the laborers left each morning. The malaria incidence among laborers in these tents was thus kept down to 4 per cent per month, or the normal rate at that time for the Canal Zone laborers sleeping in screened buildings at camps where mosquito-control work was being done. No attempt was made to screen the tents in this camp and the laborers were free to go to any other camps after dark.

The malaria-conveying species of anopheles were very numerous in the camp at that time. Le Prince also observed:

A close study of the problem has shown that a knowledge of the habits common to any anopheles may be used to advantage by sanitarians in practical malaria control. The following are some of the important points to be kept in mind:

(1) After many species of anopheles become engorged they rest on the wall or other suitable shaded resting place relatively close to where they obtained their blood meal, and it is not usual for them to fly for a considerable time after becoming engorged.

(2) Those which have digested their blood meal and are ready for flight depart from their daytime resting place (house or inclosure) either (a) soon after dusk, or (b) soon after daylight.

(3) In the screened building the anopheles ready to depart collect on the window screens or screen doors during these periods, and, with a little care and practice, practically all of them may be destroyed. While on the screens they appear to be more interested in escaping from the building than from the person who is destroying them.

(4) The recently engorged anopheles at rest on the walls of the building are relatively easy to destroy. If they are rather closely spaced a chloroform bottle or a Griffiths catching tube may be used to advantage for collecting them; but ordinarily the common fly swatter will be found of more practical use.

(5) Light-colored walls make the task an easier one. In relatively dark rooms a flash lamp or other suitable artificial light (not too bright) is an advantage in obtaining perfect results.

Fumigation with pyrethrum powder may be used to rid rooms or compartments of mosquitoes when sulphur or other methods of mosquito destruction are not practicable. Darling in making experiments with pyrethrum noted the following:

A small room with a tightly-fitting door having a capacity of 153 cubic feet was used. When pyrethrum is burned in iron pots in the usual manner there is an underlying layer of powder in the bottom of the pot, which is out of contact

with oxygen, becomes covered with ash, and fails to be consumed. This layer is from 10 to 15 per cent of the total amount of powder used. If, however, a layer of sawdust, 2 or 3 inches thick, is placed in the bottom of the iron pot in the form of a crater and the pyrethrum laid on top of this, the ensuing ignition is most complete. For in this instance air is supplied from below through the interstices of the sawdust and thus permits of complete combustion of the fumigant.

Culex and *anopheles* mosquitoes were exposed in wire-gauze cylinders in the room near the ceiling and near the floor. Twelve samples of pyrethrum powder were examined and mosquitoes killed within two hours, using 100 grams in all but one sample which required 150 grams.

Repellents of various kinds are frequently used in the presence of mosquitoes when sufficiently numerous to cause discomfort, but it is extremely doubtful if they have any virtue, and their use may lead to a false sense of security. Darling (1910) in conducting biting and infecting experiments noted the following in this connection:

The Spanish patient's hands occasionally reeked with the odor of cigarette smoke and a few of the West Indians had used citronella to prevent sand flies from biting, but in neither instance did this interfere with the mosquitoes feeding.

Protection of persons from mosquitoes.—This is a matter of screening of all buildings. The important considerations are the size of the mesh and the composition of the material used. For protection against *anopheles* a No. 16 mesh (16 holes to the inch) will prevent entrance. The materials used will depend upon local weather conditions. Screening made of copper and bronze resists the corroding action of hot moist air and hot salt moist air exceedingly well. Bronze has even better wearing qualities but is much more expensive.

To be effective, all doors should open outward and a screened vestibule, allowing the use of two doors, is advisable. Double or double swinging doors are not efficient. All cracks must be closed by pasting over with paper or by other means and, in temperate climates, fireplaces should likewise be screened. A mosquito striving all night to effect an entrance to obtain necessary food will usually find the smallest aperture.

In this connection the following observation by Le Prince is of interest:

On the Isthmus of Panama, on one occasion, we slept 60 men in each barrack and the doors by actual count were kept open as long as four consecutive minutes during the morning and evening hours when the men were entering the building. On one occasion over 200 *anopheles* were caught in one of those screened barracks with perfect screening when the doors were thus kept open.

Bed nets, when general screening of buildings is impracticable, are of some service, but to be of value the nets must be free from holes and properly used. The most minute opening due to tears or displacement of the net during sleep will convert a bed net into a

mosquito trap. The writer has counted 80 anopheles within a net in the morning when the mesh of the netting available was of improper size. Of course all mosquitoes so trapped should be killed by the occupant before leaving the net.

When nets are used with canvas cots the spread is not great and undoubtedly many persons are bitten through the net without being aware of the fact or remembering it in the morning.

Segregation of nonimmunes from unprotected native villages.—The native population of an area in which malaria is prevalent serves as a reservoir of that disease. Studies in Panama, Haiti, Philippine Islands, and elsewhere indicate that sufficient chronic carriers exist among natives to furnish an abundant supply of infected anopheles. It is desirable, therefore, to establish camps, permanent or temporary, beyond mosquito-flight distance from native communities and also to reduce personal contact with such areas to a minimum between sunset and sunrise.

Medicinal prophylaxis by the routine use of quinine.—Carter (1914) stated that quinine was used as a prophylactic in malarial countries as early as 1847, and later was used more extensively. It has been used systematically by the Italian Government since 1902. It was employed in a limited way at first but its application was extended as the good effects were noted.

The Report of the Health Department of the Panama Canal for 1920 gives the following information:

Malaria from cattle camps and plantations also shows a marked reduction, believed to be due largely to the continued use of prophylactic quinine. While it is admitted that this procedure is not ideal, and that, under ordinary circumstances, there are better ways of controlling malaria, the isolation of these camps, their temporary nature, and the class of labor seem absolutely to require the use of quinine. Every evening for the first two months following the beginning of employment each man is given 2½ ounces of an alcoholic solution containing 10 grains of quinine sulphate. After this period of 2 months each man is given the same dose, morning and evening of each Wednesday, as long as he remains in camp. While this treatment is not compulsory, by the cooperation of the foreman it is fairly well carried out, and the malaria incidence has been lowest in those camps where the prescribed measures have been followed closely.

In 1908 a battalion of about 450 marines was quartered in well-screened buildings on Diable Hill, about 3 miles from Panama City, adjacent to an extensive brackish marsh. About half of this force had recently arrived from the United States and had had no previous contact with malaria. As anopheles were present in large numbers, each man was given 5 grains of quinine in solution daily. Two cases of malaria developed 14 days after arrival. The daily dose of quinine was therefore considered to be insufficient to prevent infection, so it was increased to 10 grains. During the remaining 22 days the camp

was maintained the greatest number of admissions for malaria in any one day did not exceed five. The command was then moved to Camp Elliott, about 16 miles from Panama City, where general sanitary measures had been in effect for some time and very few mosquitoes of any kind were present. Compulsory daily prophylactic treatment was then discontinued. In the year following their arrival at Camp Elliott over 60 per cent of the men were admitted with malaria, the diagnosis being confirmed by blood smears in every case. The use of prophylactic quinine in as large a dose as 10 grains daily therefore did not prevent infection in that instance. Nevertheless, when it is necessary, as in a campaign, to keep the greatest number of men available for any duty at all times in the presence of malaria, and general sanitary measures can not be carried out, quinine given in a form readily absorbed, in a dose not less than 10 grains a day, should be used.

In permanent locations compulsory quinine prophylaxis should not be employed. Attention should be concentrated upon the general sanitary measures discussed above. All men who develop malaria, as shown by positive blood smears, should be placed upon extended, carefully supervised treatment until it is shown that they are no longer likely to infect mosquitoes.

Treatment from a preventive standpoint.—As a result of experiments conducted in Panama, Darling concluded that for administrative purposes "persons with more than 12 gametes per 1 cm. in their blood must be regarded as gamete carriers, and, of course, should not be discharged from hospital, nor should treatment be discontinued until gametes have been reduced well below the limits of infectiousness." He also stated:

This destruction and prevention of the development of the sexual forms of the parasite in man is a matter generally overlooked, but is of the greatest importance in delimiting malaria, and it may be accomplished by appropriate quinine treatment of all gamete carriers; by quinine treatment to destroy latent malaria; and by periodical blood examination for the detection of gamete carriers and latent malaria.

The effect of quinine administration, then, is to make the gametes gradually disappear from the peripheral blood by the destruction of the young forms, the gametes being phagocyted by splenic and hepatic endothelium. It is concluded that quinine, grains 10 t. i. d., in solution, will gradually reduce the sexual forms of the parasite in man to a noninfective minimum in from a few days to a few weeks, depending on the severity of infection.

In tertian malarial fever gametes disappear from the peripheral blood within two or three days under quinine treatment, and generally disappear even when quinine is withheld, if the patient is at rest. After the disappearance of the asexual forms there are never as many gametes in the peripheral blood in tertian as in estivo-autumnal malaria. As a consequence one never finds as many tertian zygotes as estivo-autumnal xygotes in infected mosquitoes.

Mitzmain (1918) gives the following as a result of his observations:

In every instance where prescribed treatment had been discontinued prior to 10 weeks relapses had occurred.

In general, it would appear that quinine sulphate, grains X, t. i. d., in solution, capsule, or tablets known to disintegrate readily, will prove efficient when used while symptoms are present. This treatment should be followed by 10 grains daily for a period of at least two months. Blood smears should be examined in each case two weeks after all treatment is terminated, and repeated at intervals if necessary, to assure a permanent cure.

When quinine is given intravenously its use should be reserved for those cases in which prompt absorption after administration by mouth is not to be expected, on account of violent gastrointestinal disturbance or other cause, or cases in which it is impossible to give the drug by mouth on account of the patient. It is the method to be used in a case where the patient is gravely ill and immediate cinchonization is deemed necessary.

With reference to the intravenous use of quinine Maxey (1922) gives the following:

In the series of cases reported by the British War Office of 127 injections of quinine bihydrochloride (15 grains) given to patients, thrombosis occurred in 4 patients—2 in both arms and 2 in one arm only.

Particularly is it necessary to be sure that the patient is not suffering from circulatory embarrassment before the injection is undertaken. The technique must be such as to minimize the danger of untoward effects. This may best be secured by observing three cardinal principles:

- A. Careful aseptic technique.
- B. Giving the drug in moderate doses and in dilution.
- C. Introducing the solution into the blood stream slowly.

All precautions which are observed in giving a dose of salvarsan should be observed in giving quinine. A sterile filtered solution of the quinine salt—dihydrochloride is generally recommended—should be prepared and diluted so that 1 cubic centimeter contains not more than one-half grain of the drug. The size of the dose should not exceed 15 grains for a normal adult. It is advisable to start with a dose of 5 grains and increase to 10 or 12 grains in the subsequent injections. The solution containing the proper amount of the drug may be taken up in a 25-cubic centimeter syringe and injected very slowly at the rate of 1 cubic centimeter per minute. The injection should be discontinued immediately if there is any suspicion that the solution is not going into the vein properly.

The dangers in the intravenous injection of quinine in the treatment of malaria are: Depression of the circulation; disagreeable and alarming nervous phenomena; and local necrosis and sloughing at the point of injection.

No evidence is found to indicate that this route possesses special advantages over ordinary mouth administration of the drug in curing the acute attack or in ridding the blood stream of sexual forms (crescents) except with regard to the speed with which therapeutic control may be initiated.

It would appear that in the outbreak of malaria at Olongapo a thorough daily search in the barracks and on the *Canopus* and sub-

marines for adult anopheles would have repaid well for the trouble. From the results obtained in the Panama Canal Zone, it seems likely had this method of control been employed from the time of arrival of the vessels at Olongapo, the outbreak of malaria might have been prevented or, at least, the incidence of malaria reduced.

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OUTBREAK OF INFECTIOUS DIARRHEA IN THE BATTLE FLEET, APRIL, 1927, NOT INVESTIGATED AT THE TIME OF OCCURRENCE

From Form F cards reaching the Bureau of Medicine and Surgery it became apparent that quite an extensive outbreak of diarrheal disease had occurred in the combined Battle and Scouting Fleets early in April, affecting at least three battleships, as well as the U. S. S. *Seattle*, two light cruisers, and several destroyers. Some of the cases were very severe, and from a clinical viewpoint they could have been regarded as bacillary dysentery. Many of the patients, on the other hand, were so little disabled that they were not admitted to the sick list. In certain ships all cases were mild.

The most serious outbreak occurred on board U. S. S. *Colorado*. The senior medical officer of that ship visited Washington after the fleet came north. Questioned as to the nature and possible causes of the outbreak, he stated that altogether about 150 officers and men had been affected, but the number admitted to the sick list was 109. From what he said the disease appeared to be infectious and communicable.

Among possible causes of the outbreak he had considered contaminated food, polluted water, and swimming in polluted water. He

also mentioned certain influences which he thought might have acted as contributory causes—lack of the protective foods, milk and fresh vegetables; too little liberty; and too close confinement in the prevailing hot weather, with air ports closed for considerable periods of time while maneuvering. No data were collected, however, from which evidence bearing definitely upon the cause might have been synthesized. No evidence of practical value from the epidemiological standpoint has been secured from any of the other vessels in which cases occurred.

The important consideration at this time is, therefore, that an outbreak of communicable disease affecting several ships, large and small, in the same fleet, at or about the same time, disabling more than 200 officers and enlisted men and attacking a large but unknown number in addition who were not placed on the sick list, could occur under circumstances pointing strongly to a common method of infection without inducing appropriate action that might have led to discovery of the cause.

From such information as could be obtained it is not possible to draw any very definite conclusions. We do know that the water in Guantanamo Bay is grossly polluted with sewage, especially when several naval vessels are anchored there. The medical officer of the *Colorado* reported that the outbreak began early in April and continued for the greater part of that month. The report also indicated that a few sporadic cases of diarrhea occurred in May while the ship was at the New York Navy Yard.

The fleet left the Panama Canal Zone, March 9, 1927, and arrived off Gonaives, Haiti, March 14, where the ships remained at anchor about two weeks. During that time most of the ships had no communication with the shore. Swimming was not permitted during the first five days of the stay in the Bay of Gonaives but after that many officers and enlisted men of most of the ships entered the water daily from over the side. We have no evidence bearing on the degree to which the water was polluted. The area available for anchorage is much greater than in Guantanamo Bay and in general the ships were anchored farther apart. The water is deeper and the entrance to the bay is much wider. Nevertheless, it should be appreciated that when a large number of ships, such as comprised the combined fleets, are anchored in formation a tremendous amount of sewage is constantly being added to the water, and bacteriological examination at any time of the day or night would probably show a much greater degree of pollution in the vicinity of most of the ships than a State health department would tolerate at a beach where public bathing is permitted.

It is understood that the wardroom mess of the *Colorado* received a small quantity of fresh fruit from the local market while in the

bay, but there is no reason to believe that had anything to do with the outbreak of diarrhea. Both in the Bay of Gonaives and later in Guantanamo Bay the *Colorado* was anchored in about the middle of a column of ships, and so the water about that vessel was probably more heavily polluted than around certain other anchorages.

Some of the ships, including light cruisers and destroyers, left for Guantanamo Bay, Cuba, about March 18. The others left March 28 and anchored in Guantanamo Bay April 2. All ships sailed from Guantanamo Bay April 18 for New York and other ports on the Atlantic coast.

Cases of diarrhea occurred as follows:

	March		April	
	Enteritis, ac.	Enterocolitis	Enteritis, ac.	Enterocolitis
U. S. S. Colorado.....	18		91	
U. S. S. Detroit.....	2		1	
U. S. S. Dobbin.....	1	1		
U. S. S. Milwaukee.....	5		6	
U. S. S. McCawley.....				6
U. S. S. California.....			5	19
U. S. S. Concord.....				4
U. S. S. Farragut.....				10
U. S. S. Nevada.....				11
U. S. S. Seattle.....			10	
U. S. S. Selfridge.....				21
U. S. S. Vestal.....	28			
	54	1	113	71

The medical officer of the *Colorado* stated that the outbreak on board that ship began about April 1, 1927. Assuming for the moment that swimming in polluted water was the cause, if the 18 cases that occurred prior to April 1 were a part of the outbreak the source of infection was the Bay of Gonaives, or, alternately, some men were infected while swimming there and others while swimming in Guantanamo Bay. Another possibility under the primary assumption is that the infection was introduced on board by men infected while swimming but that the principal part of the outbreak occurring in April was due to the contamination of food by one or several carriers among those infected earlier. It is, of course, impossible now to determine whether swimming had anything to do with the outbreak, but by questioning all patients it would have been a simple matter to determine what proportion of them, if any, had not been in swimming. Likewise, respecting other possible sources of infection, a search for a common factor could have been conducted by means of a simple epidemiological report form drafted to include suitable questions relating to food, the ship's water supply, or other matter to which attention might have been directed. The principle is the same as that followed in the form required by the

bureau in reports of food poisoning. The method applies to an epidemic of typhoid fever or an explosive outbreak of scarlet fever as well as to an outbreak of food poisoning. The object is to sort the crew into different groups each having some circumstance or the lack of some circumstance in common, not forgetting, of course, that there may be some overlapping. For example, if swimming had been the primary cause, there might nevertheless have been a number of cases resulting from direct or indirect contact.

In passing, it may be observed that had the infection been introduced on board by swimmers and then spread by food contaminated by one or more of them, under the law of chance one would expect to find that extensive outbreaks occurred on board other battleships anchored in polluted water nearby. So many links are required in such a causal chain, however—one or more members of the food-handling forces active carriers, the issue of food of a kind that might serve as culture media, etc.—that it is quite possible all essential factors were operative only on board the *Colorado* and a few smaller vessels.

If such outbreaks as these occur in the future it is to be hoped the medical officers concerned will remember it has not yet been established that low-pressure distilling apparatus as installed in the newer ships can be depended upon when distilling polluted water to furnish a distillate safe for drinking.

Capt. H. A. May, Medical Corps, United States Navy, raised this question about two years ago while senior medical officer of the U. S. S. *West Virginia*. The matter was brought to the attention of the Bureau of Engineering and data were obtained on board the U. S. S. *Colorado*, the vessel chiefly affected in this instance. It appeared that the lowest temperature attained in the first-effect evaporator shell as recorded was 194° F. The average temperature recorded for that stage was 198.5° F. It was estimated by the Bureau of Engineering that the water is usually subjected to that temperature for about 3 minutes and 41 seconds when the plant is being operated at designated capacity. The estimate was probably based on an assumption that the plant would be operated as designed up to about 10 pounds pressure on the first evaporator coil. The lowest pressure recorded during the period covered by observations taken from the log of the *Colorado* was 4 pounds.

Later, the medical officer of the U. S. S. *Utah* wrote to the Bureau of Medicine and Surgery for advice regarding the possibility that the distilled water might be polluted. He had learned from the engineer officer of the *Utah* that the temperature of water in the evaporator ranged from 141° F. to 190° F. maximum in a vacuum of 24 inches, or the equivalent of 3 pounds absolute pressure. It, therefore, appeared at that time that it was the practice on board

some ships at least to operate the plant at pressures well below 4 pounds absolute with temperatures correspondingly low—presumably too low to insure the destruction of all pathogenic bacteria.

Following the receipt of this information the subject was discussed in the NAVAL MEDICAL BULLETIN, volume 22, No. 4, April, 1925. The impracticability of attempting to conduct tests under laboratory conditions with glass apparatus instead of on board ship under actual working conditions was referred to and the following conclusions were reached:

“ * * * It would seem desirable when opportunity presents to determine whether under the worst conditions that can be arranged it will be possible to recover living microorganisms in the distilled water. Meanwhile, medical officers should bear in mind the questions which have been raised and consider carefully any evidence that points to the possibility that the distilled water is causing trouble. Those in a position to do so might well collect samples of freshly distilled water at times when it appears that the ship is distilling while in polluted water. It would not be difficult to apply the standard American Public Health Association tests for determining the presence of members of the *B. coli* group of bacilli. Aside from the question of testing the water, it would appear advisable for medical officers to discuss the matter with engineer officers and advise care in distilling polluted water with a view to preventing the temperature of the water in the first evaporator effect from falling below 190° F., the water being distilled as slowly as practicable.”

Of course, it is not possible to say whether the *Colorado's* fresh water was responsible for the outbreak. The water can not be ruled out as the source of infection merely because a majority of the officers and crew were not affected. Although not all patients were admitted to the sick list it appears that there were in all about 150 cases. That is, more than 10 per cent were affected, making an attack rate as high as has often been experienced in small cities when the public water supply suddenly became polluted.

The fact that only one or two cases of diarrhea occurred on board certain vessels during the month of April is not inconsistent with the assumption that drinking water was responsible. Available information does not indicate what ships took water from sources ashore. If water distilled in the Bay of Gonaives or in Guantanamo Bay was polluted the degree of pollution might have ranged from numerous pathogenic microorganisms per cubic centimeter to almost none, and consequently a given vessel whose fresh water contained microorganisms capable of producing gastroenteritis or dysentery might have had no cases, a few, or an extensive outbreak.

Passing to an assumption that contaminated food was the cause of the outbreaks, it can only be said that although this possibility can not be dismissed from consideration, because of the lack of epidemiological data, it would be a most unusual coincidence for several ships to be similarly affected at or about the same time. The possibility that food was contaminated by insects or vermin on board several

ships during the hot weather deserves mention. It appears that flies were not especially troublesome although they were encountered in some number at Guantanamo Bay. No evidence is available concerning rat and cockroach infestations. Contamination of food by vermin would be far more likely to cause outbreaks of food poisoning than a disease having some of the characteristics of dysentery.

Clinically, so far as could be ascertained, in the more severe cases the disease began with chilliness, moderate fever, general malaise, headache, and anorexia. Some of the patients vomited. After a few hours diarrhea began, and in the cases of those most severely infected the stools were bloody, varying in number from 12 to 50 or more in the course of 24 hours. In such cases only an ounce of bloody mucus was passed at each stool. White blood counts varied from normal to 14,000. No bacteriological findings were obtained. Many patients complained of severe paroxysmal pain in the abdomen. Acute symptoms lasted from one to three days, but in many cases the gastrointestinal tract did not function normally for two or three weeks.

The following report was submitted by the medical officer of the U. S. S. *Colorado*:

The symptoms: Onset with chilliness and moderate fever, ranging from 99 to 102. Moderate headache, general malaise, anorexia, intense thirst, and occasional vomiting. There were cramps in the belly and constant tenesmus. The belly was not tender, nor was there any rigidity. Pressure on the belly alleviated the pain somewhat. The pain was paroxysmal in character, and at such times doubled the patient up in the classical attitude of a colic. There was not a distinct diarrhea or dysentery during the first days of the disease. In fact, about an ounce of bloody mucous was all that was passed at each stool. The character of the symptoms suggested ulcers in or near the sigmoid and rectum. The frequency of the stools was about every 20 minutes to an hour. The condition lasted from one to three days, when moderate diarrhea ensued, usually instituted by a cathartic. With the diarrhea there was a gradual lessening of the frequency of the cramps, normal temperature, and a general improvement. About two or three weeks were required before the intestinal tract entirely returned to normal.

The officers as well as the enlisted men were affected. The blood count ranged from normal to 14,000 white cells, the differential count presenting nothing unusual. There was not an eosinophilia. Microscopical stool examination revealed nothing important. While there had been an epidemic of influenza of moderate severity at the beginning of the cruise, there was no apparent relation to the cases of enteritis and those of influenza. Symptomatically, the cases resembled bacillary dysentery. Intestinal influenza was considered, but there was not a leucopenia. The cases were an enteritis, and the causative organism was in all probability either one of the group causing bacillary dysentery, or one of the enteritis group. Cases were sent to the U. S. S. *Relief* with the request that cultural methods and agglutination tests be made to determine if possible the nature of the infecting organism but no report was received. This infection was not confined to the U. S. S. *Colorado*.

but was more or less universal through the fleet, as I had discussed it with the other medical officers, while in Guantanamo.

The onset was about April 1, 1927. It continued for the greater part of April and a few mild sporadic cases have appeared in May, since we have been in New York. They improved in a remarkably short time with a change of diet.

The factors playing a part in this epidemic were as follows:

1. Marked lowering of resistance of all officers and men. The personnel was taken from a brisk invigorating climate into the heat of the tropics and carried on the same schedule of work in the tropics that they had at San Pedro. Cold-storage supplies to which they were not accustomed, lack of fresh food and milk. Lack of liberty, under conditions which were really relaxation and recreation. Too close confinement in the tropics, with all air ports closed.

2. Increased exposure to infection. Swimming over the side of the ship in water highly polluted, as it must be with such a concentration as existed in Gonaives, Haiti, and most especially Guantanamo, Cuba. Inevitable pollution of the drinking water by leaks in the distilling plant, from condenser and otherwise. No dual water supply has ever been devised which was free from pollution, and battleships are no exception. While no specimen of water was sent from this ship for examination, I was unofficially informed that every ship that did have water examined contained a high percentage of colon bacilli.

The medical officer, Destroyer Division 35, submitted the following to the medical officer, Destroyer Squadrons, Battle Fleet:

All cases were characterized by a diarrhea not accompanied by tenesmus or passage of blood except in one case on the U. S. S. *Selfridge*, which was transferred to the U. S. S. *Relief*. Usually the diarrhea was of rather sudden onset and accompanied by nausea and vomiting in the milder cases, which recovered quickly. Very few cases showed any temperature.

Pharmacist's mates were instructed to enter the diagnoses of enterocolitis, acute, in such cases as seemed severe enough to warrant admission to the sick list for a day or two, for the reason that a pathological diagnosis seemed the most appropriate, in view of the fact that etiological factors seemed to vary so widely in the different groups investigated.

Destroyers affected:

U. S. S. *Selfridge* (320).—Thirty-five cases, 21 admitted to sick list for short period, believed to have been due to some thin watery ice cream which was later found to have been made at Calmanera.

U. S. S. *Marcus* (321).—Eight mild cases, none severe enough to warrant admission to sick list. Possible factors found to be either fruit or luncheon meat.

U. S. S. *Mervine* (322).—Twelve cases, four admitted to sick list for a short period. Only thing found which could be incriminated was fruit, banana or grapefruit.

U. S. S. *Chase* (323).—Fifteen cases, two men on binnacle list for less than one day. Probable cause, luncheon meat.

U. S. S. *Mullany* (325).—One case (myself) ill six hours with severe vomiting followed by one diarrhea stool and recovery. Due to salad dressing or salad eaten at U. S. S. *Arizona* smoker.

Summary of etiological factors.—Whatever the offending article of food, in each case its action was the same; that is, it either stopped digestion in the stomach to the point where the food ingested entered the intestine improperly prepared resulting in gastrogenous diarrhea or else produced sufficient gastric

irritation to cause emesis. For this reason those cases which vomited promptly and freely recovered quickly with mild enteric symptoms.

Inquiry revealed that on the naval station itself cases of similar nature had occurred from eating bananas. The health officer of the Cuban Government at Calmanera stated that occasionally cases of the sort described occurred in that vicinity from eating what is known as "second growth" grape fruit. As is usual in similar occurrences, not everyone who ate the suspected foods became ill.

In view of the fact that butter and salad oils were not entirely above suspicion, in these cases where these articles had been kept for some time under tropical conditions, associated with the fact that ice cream and luncheon meats were suspected in some cases, one is inclined to the belief that since fats are one element common to all of these, some chemical change in these producing a gastro-intestinal irritant is the most probable factor. I, myself, was unable to eat any of the butter tasted on any ship during the southern cruise on account of the unpleasant irritating ethereal sulphates present.

The commanding officer of the U. S. S. *Selfridge*, in reply to a letter inquiring into the circumstances surrounding the outbreak on board that vessel, furnished the following information:

The blame is laid upon some ice cream eaten aboard this vessel by members of the crew. While this may be correct, it is the fact that a number of the men who were sick had not eaten the ice cream and a large number who did eat the ice cream were not affected. Cases of this kind were prevalent throughout the destroyers toward the end of their stay in tropical waters.

In this vessel, from the date of leaving San Diego on February 17 until the fleet left Gonaives on April 22, the men of this destroyer were ashore for liberty only for a few hours in the Canal Zone. This is mentioned as it is believed that long periods of confinement on board destroyers in tropical waters with the small amount of fresh vegetables and fruits available, is bound to get the stomachs of the men into bad shape, making them easy prey to food poisoning.

With these examples of intricate ratiocination on file it is to be hoped that less speculation and more investigation of ascertainable facts will attend a future outbreak.

AN EPIDEMIC OF MALARIA AT THE UNITED STATES NAVAL STATION, OLONGAPO, P. I.

A sharp outbreak of malaria comprising 47 cases occurred between February 20 and April 6, 1927, among men attached to the U. S. S. *Canopus* and Submarine Division 17 during their annual overhaul at the United States Naval Station, Olongapo, P. I.

Malaria is usually endemic among the natives living in the village of Olongapo, located on Subig Bay, about one-half mile northeast of the naval station, and becomes epidemic at times, especially during the rainy season from June to November.

The *Canopus* and most of the submarines arrived at Olongapo on January 14, 1927. The *S-38* reached the station December 17, 1926, and two other submarines early in February.

The crew of the *Canopus* was quartered aboard, but the men from all the submarines were ashore in three separate barracks. It is not clear whether the buildings were screened. All men slept in cots and during the first week all cots were equipped with mosquito nets. As a further precaution, inspections were made during the night by the master-at-arms of each building to see that these nets were being used. Inspections were also made by the submarine duty officer. After the appearance of malaria, the medical officer also inspected the quarters while the men were asleep to make sure that no one was exposed to the bites of mosquitoes.

The crew of the *Canopus* slept aboard the ship in their regular quarters. They were not protected either by screening or by mosquito nets. During the course of the outbreak 22 members of the crew became infected.

No mosquitoes, larvæ, or breeding places were found on the naval station or at the rifle range situated at Maquinaya about 3 miles north of the station and about 2½ miles north of the native city of Olongapo. It being the dry season, no collections of standing water were found at the rifle range or on the naval station.

It was learned that sporadic cases of malaria among the native residents of Olongapo were being treated at the Town Hospital after the *Canopus* and submarines arrived. Later, the number of cases so treated increased to such an extent that malaria was considered to be epidemic among the natives. With this knowledge, the medical officer looked for breeding places of the anopheles mosquito in the surrounding country. With the cooperation of the Public Health Service steps were taken to prevent further breeding in the city of Olongapo and near-by areas. From March 22 the personnel were not allowed to visit this section from sunset to sunrise.

The prevailing wind during January, February, and March was from the northeast blowing directly from the infected area over the naval station across a small arm of Subig Bay. At the height of the epidemic anopheles mosquitoes were found on the naval station and on board the *Canopus*, but no larvæ were discovered after careful search at any time.

In the latter part of the overhaul period, the men working in the battery shop ashore were bitten by mosquitoes while at work during the day. These mosquitoes were identified as *Aedes*. Larvæ were found developing in a near-by pit that contained a small collection of water. This was then oiled.

The first case of malaria among the naval personnel appeared February 20, 1927. This proved to be of the tertian type. The patient was a radioman attached to one of the submarines and slept on a cot in one of the barracks ashore. Symptoms of malaria developed 37 days after his arrival at Olongapo. In the following

27 days seven men were attacked, and then cases appeared so frequently that the term epidemic describes the situation. During the next 18 days 40 patients were admitted to the sick list. The last case of the outbreak occurred April 6, 1927.

In 34 of the 47 cases the infecting organism was identified as the aestivo-autumnal parasite, and the remaining cases showed the infection to be of the benign tertian type. There was one recurrence in addition.

The 13 men whose blood smears were positive for tertian malaria all had a frank chill, followed by fever, and sweating. All of the 37 cases having the aestivo-autumnal infection complained of chilly sensations without a definite chill. Most of these cases had nausea, vomiting, epigastric distress, and headache. Pulmonary symptoms developed in seven cases shown by pain in the chest, usually sub-sternal, expectoration, and rapid respiration. Physical examination in all of these cases showed some slight dullness to percussion at the base of the lung posteriorly and on the right side in most instances.

In the benign tertian cases the response to quinine therapy was prompt, but tardy in those with the aestivo-autumnal infection, particularly those with pulmonary symptoms, in which cases the patients were extremely ill. Quinine was given intravenously in three cases because of severe and protracted nausea and vomiting. The response was satisfactory.

Soon after the ships arrived at Olongapo, a permanent working party was sent to the rifle range at Maquinaya and parties were sent there from time to time for rifle practice. None of the men who later became infected had been on the range within a month from the beginning of the attack. It was, therefore, considered that the rifle range was not the source of infection. In 22 cases the men admitted having been in the native city of Olongapo or in the surrounding area after sunset within a period of 14 to 21 days preceding the attack. As for the remaining 25 cases, the patients stated that they had not been in the district known to be infected. It is probable that they were bitten by mosquitoes which had flown to the naval station, probably assisted by the prevailing wind, after feeding upon infected natives.

When it became apparent that the men were being infected, the question of quinine prophylaxis was discussed by the several medical officers present. Under the existing circumstances it was considered that prophylactic doses of quinine would only mask symptoms in persons already infected who were passing through the incubation period and, therefore, should not be given.

The overhaul period having been completed, the ships proceeded to Manila, P. I., arriving March 30, 1927. The next day the malarial control board of the Public Health Service at Manila visited the

Canopus and submarines. Blood smears were taken from every officer and man. No malarial parasites were found in any of the 576 slides studied. This eliminated the possibility of carriers among the crews. Three men were admitted with symptoms of malaria within the six days following this examination and gave positive blood smears. It is probable they had become infected at Olongapo and that malarial parasites had not appeared in their peripheral circulation when the slides were taken for the control board.

**TWO DEATHS FROM RABIES CONTRACTED BY PLAYING WITH A DOG
WHICH WAS INCUBATING THE DISEASE IN HANKOW, CHINA**

January 14, 1927, a fireman, second class, United States Navy, appeared at the sick bay on board U. S. S. *Pigeon* complaining of nausea, vomiting, and difficulty in breathing. Breathing was irregular and spasmodic. Spasmodic contractions of the muscles of the neck and larynx were noted, especially when he attempted to talk or drink water. His temperature was 101.2° F. and the pulse rate 66.

The following information was elicited: He had played with a dog while on liberty in Hankow, China, about six weeks before. He said the dog did not bite him but that he had received slight abrasions of the hands. The skin lesions were so trivial they caused him no concern. Several of his shipmates who were with him also played with the dog. Other men who had been members of the liberty party confirmed the patient's statement that there was nothing unusual about the dog's actions, but one man said he understood the dog had been killed two days later by its owner because it was vicious.

The medical officer had no knowledge of the circumstances until the patient presented symptoms of rabies. The course of the disease was quite typical. Death occurred on the third day, apparently from paralysis of the muscles of respiration after a series of general convulsions.

When he learned that his companion had died from rabies, another man, a fireman, first class, reported that he had received a slight wound of the hand while playing with the same dog a little more than six weeks before. Antirabic treatment was at once begun with the Semple modification of the Pasteur method—phenol-killed virus. The course of inoculations was completed February 1, 1927.

February 10 the man complained of weakness of both legs. Three days later his arms were weak. From the appearance of these symptoms the clinical course was that of acute ascending paralysis involving the legs, arms, muscles of the neck, and respiratory muscles. The patient died February 17, 1927.

The medical officer was inclined at first to believe the symptoms were due to the treatment virus, but when paralysis developed and

death ensued he thought the cause was rabies, paralytic type. There was nothing remarkable about the brain at post-mortem examination. Sections were sent to the United States Naval Medical School.

The brain tissues were carefully studied by Surg. R. D. Lillie, United States Public Health Service, at the United States Hygienic Laboratory. Sections were also made and studied at St. Elizabeths Hospital, Washington, D. C. A prolonged search was made for Negri bodies, but they could not be found. The findings of microscopical examination were reported as consistent with ascending paralysis, Landry type.

In view of these findings the question arises whether death was caused by rabies—living virus transferred from the dog—or by the killed virus used in the treatment. Kraus, Gerlach, and Schweinburg stated in a monograph published in 1926, "*Lyssa bei Mensch und Tier*," that paralysis is sometimes caused by dead rabies virus and that it is especially frequent with heat-killed, fixed virus. They considered that they did not have sufficient evidence regarding phenol-killed virus to justify any conclusion. On the other hand, we have been informed that in the largest clinic in India, where about 250 inoculations a day are made with phenol-killed virus for protection against rabies after bites by rabid and possibly rabid animals, paralysis is not known. It was Pasteur's belief that rabies modified by treatment sometimes eventuated in paralysis.

The evidence appears to be strongly presumptive that death in this case was caused by the living street virus, even though Negri bodies were not demonstrated in sections from the brain. The primary cause of death has therefore been recorded for statistical purposes as rabies. In the first case the disease was undoubtedly rabies. In the second case the man was wounded by the same dog at about the same time. So much time had already elapsed—more than six weeks—before treatment with phenol-killed virus was begun, that failure to protect is not very significant, and yet modification of the disease could well have taken place.

FREQUENCY OF RABIES

The two cases mentioned above are the only ones which have been recorded as occurring in the Navy during the past decade. The statistics of earlier years were not searched.

It was brought out in the last annual conference of State and Territorial health officers of the United States that rabies has increased to a more or less alarming extent in certain States during the past few years. The epizootology of the disease is not yet thoroughly understood. Rabies among dogs, particularly stray dogs, varies

from year to year. For example, in a given county the number of rabid dogs discovered may be unusually high for a year or two, and then without special measures such as vaccination, wholesale killing of stray dogs, rigid enforcement of a muzzling law, etc., the disease decreases in prevalence or even disappears for a number of years. These natural increases and decreases in prevalence should be borne in mind. There has been a tendency on the part of health officials to attribute greater value to certain measures than the facts seem to warrant. Almost any course of administrative action will appear to give good results during a period in which the seeding of rabies virus is naturally decreasing among animals at large. In some parts of the country vaccination of valuable dogs with killed virus has been extensively advocated. While vaccination of dogs in Japan was thought to be largely instrumental in eradicating the disease, it may be said that little or no evidence of scientific worth has yet been secured in the United States to show that vaccination of dogs with one dose of killed virus can be relied upon to prevent them from developing rabies if bitten by a rabid animal. There is some evidence indicating that two or more injections of killed virus are not without danger in themselves. It appears that a number of valuable dogs have been killed in this way.

The most practical preventive measure to-day would seem to be reduction of the population of ownerless dogs to a minimum.

Although it is very generally understood, it may not be out of place here to remark that under no circumstances should a dog suspected or having rabies be killed if he can be caught and kept under observation. Obviously the medical adviser of a person who has been bitten by such a dog can act more intelligently if the dog is allowed to live. It may be possible to avoid antirabic treatment. If the dog is infected, symptoms will appear within two weeks. If the dog is killed, the best that can be done is to cut the head off, pack it in ice, and send it to the laboratory with the least possible delay. While it is true that the detection of Negri bodies is often certain it should be remembered that a great responsibility is placed on the man in the laboratory in some instances. In case of doubt he will naturally be inclined to report rabies.

AN OUTBREAK OF MUMPS AMONG MIDSHIPMEN AT THE UNITED STATES NAVAL ACADEMY

It having become apparent from Form F statistical cards received in the Bureau of Medicine and Surgery about February 1, 1927, that mumps was epidemic at the United States Naval Academy, the senior medical officer was requested to collect information bearing on the number of midshipmen presumably immune by reason of having

had the disease previously, and also data relating to rates of spread among members of different companies. Commander C. J. Holeman, Medical Corps, United States Navy, conducted the study and presented figures on which the following discussion is based.

It appears that the first case of the outbreak among midshipmen was discovered January 13, 1927, a considerable time after the disease had become prevalent in Annapolis. A number of cases had occurred among officers' children attending school in the city. Midshipmen were directed not to visit houses in which the disease was known to be present, but under the circumstances it was not to be expected that infection could be avoided altogether except possibly by strict quarantine of the Naval Academy maintained for many weeks.

The outbreak may be regarded as having begun January 13, 1927, with one case. The last case was discovered April 16. In all there were 129 cases, but of these 7 were of mess attendants and 4 were of naval personnel other than midshipmen. The incidence of the disease at the Naval Academy, by days, was as follows:

Date	Cases	Date	Cases	Date	Cases	Date	Cases
Jan. 13.....	1	Feb. 11.....	1	Feb. 26.....	3	Mar. 14.....	3
Jan. 22.....	1	Feb. 14.....	1	Feb. 27.....	2	Mar. 17.....	1
Jan. 29.....	1	Feb. 15.....	2	Mar. 1.....	1	Mar. 19.....	2
Jan. 30.....	8	Feb. 17.....	2	Mar. 2.....	2	Mar. 21.....	5
Jan. 31.....	9	Feb. 18.....	2	Mar. 5.....	1	Mar. 24.....	1
Feb. 1.....	7	Feb. 19.....	3	Mar. 6.....	1	Mar. 25.....	2
Feb. 2.....	6	Feb. 20.....	3	Mar. 7.....	3	Mar. 28.....	1
Feb. 3.....	4	Feb. 21.....	4	Mar. 8.....	2	Mar. 31.....	1
Feb. 4.....	4	Feb. 22.....	1	Mar. 9.....	2	Apr. 5.....	1
Feb. 5.....	4	Feb. 23.....	12	Mar. 11.....	2	Apr. 7.....	2
Feb. 7.....	1	Feb. 24.....	3	Mar. 12.....	3	Apr. 11.....	1
Feb. 9.....	1	Feb. 25.....	3	Mar. 13.....	2	Apr. 16.....	1

It was, of course, impossible to trace all contacts, direct and indirect, among midshipmen within the academy, and the number of midshipmen who contracted mumps by exposure to outside foci of infection during the progress of the epidemic is not known. Commander Holeman thought it fair to assume that the epidemic continued as it arose through contacts outside the Naval Academy. Additional importations of the disease from outside sources doubtless occurred during the course of the outbreak, so the figures can not be taken to indicate actually the probable rate at which mumps tends to spread among young adult males in such an institution in the absence of contact with outside foci of infection. Each separate importation might serve as a focus for some additional spread within the institution. This, however, is of no great importance, because the object here is to record the maximum degree of spread. The discussion is therefore developed in part as though all secondary cases were contracted within the institution.

The attack rate for all midshipmen during the epidemic period was 7.4 per cent. It appears that 1,101, or 68.8 per cent of the midshipmen, according to their statements, had previously had mumps. In this group the attack rate was 3.1 per cent, whereas among 489, or 30.6 per cent, who probably had not already had the disease, the rate was 17 per cent. No definite history could be obtained from 9 midshipmen, or 0.6 per cent.

These figures are given for what they are worth. The third company of midshipmen had the highest attack rate, 12.6 per cent, and the highest percentage of members reported to have had mumps previously, 72.1 per cent. If all those who said they had had mumps really had been previously infected, and if the disease usually confers lasting immunity, as is generally assumed under the law of chance, one would not expect an attack rate so high as 12 per cent with nearly three-fourths of the group registering immune. Commander Holeman thought the figures indicated that it was fallacious to assume that any marked degree of immunity is derived from a previous attack. Such a conclusion can not be drawn, because degrees and frequencies of exposure are indeterminate. In that company, among 53 susceptibles, there were 14 cases of mumps, making the attack rate 26.4 per cent, while among 137 members of the company who thought they had had the disease there were 10 cases, making the attack rate 7.3 per cent. One might conclude that that particular company was, first and last, more heavily exposed than other companies. With heavy and repeated exposure, it would not be surprising to find a few cases occurring among men who have previously had the disease, and it can not be taken for granted that every individual who thinks he has had mumps has really been infected with mumps virus. Small numbers of midshipmen in other companies who thought they had already had the disease presented symptoms which were considered to justify recording as mumps. Data for all companies are given in the following table:

Company	Members without history of mumps	Cases	Attack rate (per cent)	Members with previous history of mumps	Cases	Attack rate (per cent)	Attack rate, entire company
First	68	13	19.1	133	1	0.8	6.9
Second	60	6	10.0	139	3	2.2	4.4
Third	53	14	26.4	137	10	7.3	12.6
Fourth	58	14	24.1	146	1	.7	7.4
Fifth	56	17	30.4	143	5	3.5	11.0
Sixth	68	12	17.6	129	7	5.4	10.1
Seventh	66	2	3.0	137	4	2.9	3.0
Eighth	60	5	8.3	137	3	2.2	4.1

Mumps has been introduced into the Naval Academy from time to time in past years without displaying any notable tendency to

spread. Admissions during the past five years and attack rates by years were as follows:

Year	Cases	Per cent of personnel attacked
1922.....	2	0.07
1923.....	9	.27
1924.....	6	.02
1925.....	2	.00
1926.....	9	.41

The indicated degrees of spread are in marked contrast to experience during the epidemic of 1927, and the difference in the behavior of the disease supports a belief that in reality midshipmen were infected outside the academy on numerous occasions during the course of the outbreak.

In all but three instances patients were transferred to hospital as soon as they presented symptoms, and there was therefore little opportunity to spread the disease after the appearance of clinical manifestations. In the three exceptional cases the patients were held under observation for one day, but it is not likely they could have transferred the disease after they came under observation. To assume that the disease was spread from midshipman to midshipman it would seem necessary to assume that the virus was transferred before the infecting individuals became sick. The evidence does not justify a conclusion regarding transmission of the disease during incubation periods in this particular outbreak. Rosenau states the disease is communicable before the appearance of symptoms and for as long as six weeks after symptoms have disappeared. Park states the disease is presumably communicable until the parotid gland has returned to its normal size.

An effort was made to trace contact between later cases and those which had occurred earlier. On and after February 13, each midshipman admitted to the sick list with mumps was questioned regarding possible contact with others who had had the disease. The cases were then plotted by weeks, beginning with the week ending January 15. The data thus arranged are shown in Chart No. 1.

Noting the development of three separate peaks with this arrangement, Commander Holman divided all cases into three groups. How nearly these groups actually represented three different exposure periods can not be estimated, but reference to the table showing admissions by days suggests that the disease was not spread altogether by successive groups of cases. As brought out above, a considerable but indeterminate percentage of the cases may be attributed to contact with infection outside the Naval Academy. Nevertheless, in

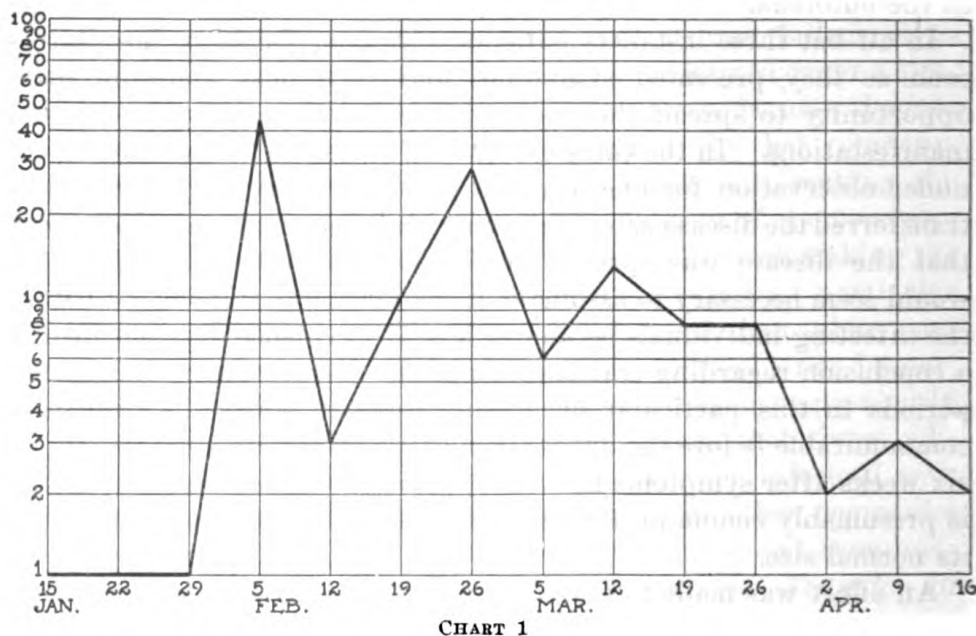
order to trace contacts it was convenient to group the cases in some manner.

Group A comprised 46 patients admitted to the sick list between January 9 and February 12. These were not questioned.

Group B comprised 44 patients admitted between February 13 and March 5. Three members of this group had come into sufficiently intimate contact with two members of Group A to have made transfer of the virus possible, either because they were roommates, messmates, or had been closely associated in athletics.

Group C comprised 28 patients, admitted between March 6 and April 16. Seven members of this group were found to have been in

ADMISSIONS FOR MUMPS AT THE U.S. NAVAL ACADEMY,
ANNAPOLIS, MARYLAND, BY WEEKS.
WEEK ENDING JANUARY 15, TO WEEK ENDING APRIL 16, 1927.



contact with 6 members of Group B. One member of Group C, taken sick March 26, and another taken sick March 28, had been in contact with a patient prior to the latter's admission to the sick list March 11. Another member of Group C, taken sick April 16, was the roommate of a midshipman admitted March 24.

There were no cases in Groups A and B suggesting transfer of infection between members of the same group. The relationships thus recorded certainly offer little evidence indicating that the outbreak was principally supported by foci of infection within the institution; but, of course, the disease may have been disseminated indirectly by untraced means. Contact with the virus in the mess hall was possible as well as in dormitories. In the course of the

epidemic, seven mess attendants, who served midshipmen in the mess hall, contracted mumps. They probably did not transfer the disease to any midshipman, since in no case did a mess attendant become ill until more than five days after the last affected midshipman, whom he served, had been admitted to the sick list.

While some or all of the seven mess attendants who had mumps may have contracted the disease outside the academy, it is more probable that they were infected by indirect contact with midshipmen. And if seven mess attendants were effectively exposed it is reasonable to infer that a good many cases among midshipmen were due to the transfer of infection within the regiment.

According to Park the incubation period of mumps is from 4 to 25 days, the average period being about 14 days. According to Rosenau the incubation period is variously stated at from 8 to 30 days. He remarks that for public-health purposes the maximum period is placed at 21 days. According to the report of the Committee of the American Public Health Association on standard methods for the control of communicable diseases, the incubation period is 4 to 25 days and the common or usual period is 14 days while the maximum common period is 21 days.

Contemplating an incubation period of 14 days and assuming that the usual exposure-time period was about 14 days, the cases, including 11 besides those of midshipmen, may be arranged as follows, the first time period including the initial case discovered January 13: 1, 36, 16, 39, 20, 12, 4, 1, 0.

With this arrangement the epidemic continued for eight time periods. The curve represented by these figures is not as symmetrical as that obtained under the proposition that the usual exposure-time period was 21 days. In setting forth the figures for both curves it was assumed that effective exposure to the initial case occurred in the middle of the first time period, 14 and 21 days, respectively. On the basis of a 21-day period the figures are as follows: 2, 47, 48, 26, 6, 0.

If the period of infectivity generally associated with cases was about 21 days, the epidemic extended over five rather than eight time periods. There is some reason to believe from experience with mumps on board ship, where spread is confined within the organization, that 18 days most often represents the time elapsing between different crops of cases. With that interval the cases would be grouped as follows: 2, 45, 42, 23, 12, 5, 0.

Doubtless a good many of the cases were contracted within the academy. Varying incubation periods and additional cases due to exposure outside the academy probably account for the dispersion which resulted in the discovery of new cases nearly every day after the epidemic had gained headway. It was considered highly

probable that a number of cases were due to contacts established at Naval Academy hops. These would include contact between midshipmen of different companies as well as with outside foci of infection. Study of the outbreak suggests that under conditions similar to those existing for the regiment of midshipmen an epidemic of mumps may be expected to terminate within five or six 18 to 21 day time periods.

Preventive measures taken were:

- (a) Immediate transfer of patients to hospital.
- (b) Instruction of midshipmen regarding precautions to avoid infection.
- (c) Observation of midshipmen presumed to have been exposed.
- (d) Disinfection of bedding of patients and roommates.
- (e) Close supervision of the sterilization of mess gear.

It was rational not to apply irksome quarantine measures.

There seemed to be no considerable correlation between differences in housing conditions and the incidence of mumps in different battalions. The quarters of the second and fourth battalions, in which 6.7 per cent of the members were attacked, are generally considered to be somewhat better than those of the first and third battalions in which 8.1 per cent of the members contracted mumps. The difference is not significant, in view of attack rates by battalions, which were as follows:

	Per cent
First battalion.....	5.7
Second battalion.....	9.9
Third battalion.....	10.6
Fourth battalion.....	3.5

Complications.—Orchitis was a complication in 27 or 22.9 per cent of the cases. In two cases orchitis was believed to be the sole manifestation of mumps. From the dates of onset of orchitis it was doubtful whether involvement of the testicle should be regarded as a sequel of mumps or as a part of the acute stage of infection. Orchitis developed variously in the 27 cases between the second and seventeenth day. The right testicle was involved in 16 cases, the left in 10, and both in one case. The apparent severity with which the salivary glands were affected bore no relation to the onset of orchitis. All patients were kept in bed for at least 10 days, so physical activity was not a factor causing orchitis.

In a number of cases, after the temperature had been normal for several days, the patients became nauseated, the temperature again rose to about 101° F., the tongue became coated, and malaise, anorexia, and sometimes myalgia supervened. In some of the cases such symptoms heralded the appearance of orchitis, but in others there were no signs of orchitis or involvement of any other organ

besides the glands primarily affected. Sick days per case averaged 16.8.

HEALTH OF THE NAVY

The general admission rate from all causes, based on returns for April, May, and June, 1927, was 502 per 1,000 per annum. Records of the preceding five years show that the median rate for the corresponding three months is 584.

The admission rate from disease was only 457. The median for the preceding five years is 512. Lower rates this year and last year are partly due to changes in statistical practice as a result of which admissions are no longer recorded for diseases and conditions reported as existing prior to appointment or enlistment. Furthermore, in past years admissions were frequently made for conditions now accounted for as complications and sequelæ of diseases and injuries for which admissions have already been recorded. On the other hand, complete reporting has been promoted in every way possible and a greater number of cases taken up on morning reports of sick for one or two days has doubtless tended to increase admission rates. Admission rates now more truly indicate the actual number of cases of diseases and injuries treated.

The admission rate from accidental injuries was only 44 per 1,000 per annum during the quarter. Expectancy, as indicated by the median rate of the preceding five years, for the months of April, May, and June, was 61.

Influenza continued prevalent at the United States Naval Training Station, Hampton Roads, Va., where 282 cases were reported. The incidence of scarlet fever was greater than usual during the spring months, 59 cases having been reported by all ships and stations. Measles and mumps also showed increases. Notifications were 173 cases of the former and 558 of the latter.

Six cases of cerebrospinal fever were reported during the quarter. A case appeared on board the U. S. S. *Mississippi* on April 5. One case occurred at the United States Naval Training Station, Newport, R. I., April 20. The United States Naval Training Station, Great Lakes, Ill., reported a case May 15 and another June 14. A case developed on board the U. S. S. *Idaho* May 15, and the United States Naval Training Station, San Diego, Calif., reported a case May 17.

TABLE No. 1.—*Summary of morbidity in the United States Navy and Marine Corps for the quarter ended April 30, 1927*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	75,510	38,760	19,470	114,270
All causes:				
Number of admissions.....	7,979	6,385	2,472	14,364
Annual rate per 1,000.....	422.67	658.93	507.86	502.31
Disease only:				
Number of admissions.....	7,302	5,751	2,270	13,053
Annual rate per 1,000.....	386.81	593.50	466.36	456.92
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	2,137	2,462	640	4,599
Annual rate per 1,000.....	113.20	254.08	131.48	160.99
Venereal diseases:				
Number of admissions.....	2,619	1,053	778	3,672
Annual rate per 1,000.....	138.74	108.67	159.84	128.54
Injuries:				
Number of admissions.....	671	576	202	1,247
Annual rate per 1,000.....	35.54	59.44	41.50	43.65
Poisoning:				
Number of admissions.....	6	58	0	64
Annual rate per 1,000.....	.32	5.98	0	2.24

TABLE No. 2.—*Deaths reported, entire Navy, during the quarter ended June 30, 1927*

		Navy			Marine Corps		Nurse Corps	Total
		Offi- cers	Mid- ship- men	Men	Offi- cers	Men	Nurses	
Average strength.....		8,432	1,455	84,459	1,183	18,249	492	114,270
CAUSES: DISEASES								
Primary	Secondary or contribu- tory							
Abcess, brain.....	None.....			1				1
Do.....	Pneumonia, broncho.....			1				1
Abcess, lung.....	Pleurisy, suppurative.....			1				1
Abcess, peritonsillar.....	Septicemia.....			1				1
Alcoholism, acute.....	None.....			1				1
Do.....	Aortitis, myocarditis, chronic.....					1		1
Appendicitis, acute.....	Obstruction, intestinal from external causes.....			1				1
Do.....	Peritonitis, acute, gen- eral.....			1				1
Asphyxiation, illuminat- ing gas.....	Pneumonia, broncho.....			1				1
Cerebrospinal fever.....	None.....			2		1		3
Cholangitis, acute.....	Peritonitis, acute, gen- eral.....			1				1
Carcinoma, bladder.....	None.....			1				1
Carcinoma, liver.....	do.....			1				1
Carcinoma, intestines.....	do.....				1			1
Diverticulitis, acute, in- testinal.....	Peritonitis, acute, gen- eral.....			1				1
Encephalitis, lethargic.....	Pneumonia, broncho.....			1				1
Epithelioma, tongue.....	None.....	1						1
Erysipelas, face.....	do.....					1		1
Hemorrhage, cerebral.....	Gastritis, acute.....					1		1
Influenza.....	Pneumonia, broncho.....			2				2
Do.....	Pneumonia, broncho and pleurisy, suppara- tive.....			3				3
Do.....	Pneumonia, broncho, endocarditis, acute ulcerative (malignant).....					1		1
Measles.....	Pneumonia, broncho.....			2				2
Meningitis, cerebrospinal.....	None.....			1				1
Do.....	Pneumonia, broncho.....			1				1
Myocarditis, chronic.....	None.....			1		1		2

TABLE No. 2.—Deaths reported, entire Navy, during the quarter ended June 30, 1927—Continued

		Navy			Marine Corps		Nurse Corps	Total
		Offi- cers	Mid- ship- men	Men	Offi- cers	Men	Nurses	
Average strength.....		8,432	1,455	84,459	1,183	18,149	492	114,270
CAUSES: DISEASES								
Primary	Secondary or contribu- tory							
Nephritis, chronic.....	Myocarditis, chronic.....			1				1
Obstruction, intestinal, from external causes.....	None.....					1		1
Pneumonia, lobar.....	do.....			2				2
Do.....	Dilatation, cardiac, acute.....			1				1
Do.....	Endocarditis, acute.....			1				1
Sarcoma, neck and lungs.....	None.....			1				1
Sarcoma, testicle.....	do.....			1				1
Sinusitis, frontal.....	do.....					1		1
Syphilis.....	Malaria, tertian (inocu- lation).....			1				1
Do.....	Poisoning, salvarsan, acute.....			1				1
Tuberculosis, chronic, pul- monary.....	Myocarditis, acute.....			1				1
Do.....	Pleurisy, suppurative.....			1				1
Do.....	Ulcer, intestinal and hemorrhage, intestinal.....					1		1
Ulcer, duodenum.....	Peritonitis, acute, gen- eral.....					1		1
Do.....	Septicemia.....	1						1
Ulcer, stomach.....	Peritonitis, acute, gen- eral.....			1				1
Valvular heart disease, mitral insufficiency.....	None.....			1				1
Valvular heart disease, combined lesions, aortic and mitral.....	Endocarditis, acute.....					1		1
Total for diseases.....		2		38	2	10		52
CAUSES: INJURIES AND POISONING								
Burns, burning gasoline.....	None.....	2						2
Do.....	Submersion.....	2						2
Crush, both legs, train.....	None.....					1		1
Drowning.....	do.....	1		5		3		9
Fracture, left femur.....	Shock (post operative).....			1				1
Fracture, compound, skull.....	None.....					1		1
Injuries, multiple extreme.....	do.....	2		4				6
Do.....	Hemorrhage, traumatic.....			1				1
Do.....	Psychoneurosis neuras- thenia.....	1						1
Intracranial injury.....	None.....			1				1
Wound, penetrating skull.....	do.....			2		2		4
Wound, penetrating tho- rax.....	Fracture, compound, right arm.....					1		1
Wound, punctured, chest.....	None.....			1				1
Wounds, multiple heart, lungs, and abdomen.....	Fracture, compound, skull (fall).....			1				1
Poisoning, morphine, acute.....	None.....			1				1
Total for injuries and poisonings.....		8		17	1	7		33
Grand total.....		10		55	3	17		85
Annual death rate per 1,000, all causes.....		4.74		2.61	10.14	3.73		2.98
Annual death rate per 1,000, disease only.....		.95		1.80	6.76	2.19		1.82
Annual death rate per 1,000, drowning.....		.47		.24		.66		.31
Annual death rate per 1,000, injuries.....		3.32		.52	3.38	.88		.81
Annual death rate per 1,000, poisoning.....				.05				.04

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by naval training stations:

Cumulative data

	Number	Per cent of recruits received	Per cent of recruits reviewed
JAN. 1 TO DEC. 31, 1926			
All naval training stations:			
Recruits received during the period.....	16,212		
Recruits appearing before Board of Medical Survey.....	842	5.19	
Recruits recommended for discharge from the service.....	496	3.06	58.91
APRIL, MAY, JUNE, 1927			
U. S. Naval Training Station, Hampton Roads, Va.:			
Recruits received during the period.....	1,287		
Recruits appearing before Board of Medical Survey.....	12	.93	
Recruits recommended for discharge from the service.....	12	.93	100.00
U. S. Naval Training Station, Great Lakes, Ill.:			
Recruits received during the period.....	1,161		
Recruits appearing before Board of Medical Survey.....	49	4.22	
Recruits recommended for discharge from the service.....	44	3.79	89.80
U. S. Naval Training Station, San Diego, Calif.:			
Recruits received during the period.....	763		
Recruits appearing before Board of Medical Survey.....	35	4.59	
Recruits recommended for discharge from the service.....	35	4.59	100.00
U. S. Naval Training Station, Newport, R. I.:			
Recruits received during the period.....	1,123		
Recruits appearing before Board of Medical Survey.....	77	6.86	
Recruits recommended for discharge from the service.....	26	2.32	33.77

ADMISSIONS FOR INJURIES AND POISONING, SECOND QUARTER, 1927

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during the second quarter, 1927, is based upon all Form F cards covering admissions in those months which have reached the bureau:

	Admissions, April, May, and June, 1927	Admission rate per 100,000 per annum	Admission rate per 100,000, year 1926
INJURIES			
Connected with work or drill.....	650	2,275	3,036
Occurring within command but not associated with work.....	377	1,320	2,017
Incurred on leave or liberty or while absent without leave.....	220	770	1,086
All injuries.....	1,247	4,365	6,139
POISONING			
Industrial poisoning.....	1	3	53
Occurring within command but not connected with work.....	59	207	195
Associated with leave, liberty, or absence without leave.....	4	14	126
Poisoning, all forms.....	64	224	374
Total injuries and poisoning.....	1,311	4,589	6,513

Percentage relationships

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave, liberty, or A. W. O. L.	
	April, May, and June, 1927	Year 1926	April, May, and June, 1927	Year 1926	April, May, and June, 1927	Year 1926
Per cent of all injuries.....	52.1	49.4	30.2	32.9	17.7	17.7
Per cent of poisonings.....	1.6	14.1	92.2	52.2	6.2	33.7
Per cent of total admissions, injury, and poisoning titles.....	49.7	47.4	33.2	34.0	17.1	18.6

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction," or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases, selected from April, May, and June, 1927, reports, are worthy of notice from the standpoint of accident prevention:

Hatchway hazards.—A hatch cover on a battleship was not properly secured. It fell while a man was passing through the hatch, causing a lacerated wound of the hand. Loss of time, 3 days.

Hammock hazards.—An apprentice seaman at a training station was thrown to the deck while being aroused by a petty officer. He received a contusion of the hip. Loss of time, 8 days.

Landplane propeller hazard.—While moving the propeller of a landplane to turn the engine over, an aviation machinist's mate received comminuted fractures of the radius and ulna. He did not know that the ignition switch was closed. The accident was reported as due to the carelessness of others. Loss of time, 96 days.

Careless handling of firearms.—A marine on duty with an expeditionary force loaded his rifle just before going on guard duty, but neglected to turn the safety lock. It was discharged accidentally later. He received a lacerated wound of the right hand and spent 19 days on the sick list.

A loaded service pistol was accidentally discharged while a man was cleaning it. The bullet wounded another man in the shoulder. Loss of time, 17 days.

Gasoline hazards.—While examining a gasoline drain with an open light in the Tropics a marine received first degree burns of both forearms from the resulting explosion. He was disabled for 16 days.

Gasoline fumes from leaking gasoline drums stored nearby accumulated in a vegetable locker on a battleship. While seven men

were at work in the locker one of them struck a match. An explosion followed. All of the seven men were treated in a hospital for severe burns. Loss of time was 40 to 42 days in each case. An investigation failed to show why the fumes accumulated.

Careless handling of gunpowder.—After loading saluting shells, a gunner's mate on a battleship swept up the deck. Not knowing what to do with the mixture of powder and dirt in the sweepings, he decided to dispose of it in the incinerator. He was treated in hospital 84 days for burns of the face, arms, and thorax received in the resulting explosion.

A chief petty officer on a destroyer dropped some gunpowder on his sleeve. The powder was ignited when the man lit a cigarette. The result was severe burns of the right arm and chest. Loss of time, seven days.

Careless handling of an explosive mixture.—A bucket containing ethyl chloride was emptied into a trough of a crew's head aboard ship. A man was on the sick list one day for burns on the buttocks when the ethyl chloride was ignited by another person lighting a cigarette.

Chemical agents and disinfectants.—One man received a burn on a foot when he moved a can of cresol without taking the precaution of closing the can. Loss of time 6 days.

Unsafe practice—Steam-line hazards.—A man received burns of the arm and shoulder while repairing a pump. His helper pulled a valve and broke the steam line without warning. Loss of time 15 days.

Unsafe practice.—While at work a man pointed his finger at a revolving propeller. He received a lacerated wound of the finger. Loss of time 5 days.

Skylarking.—While two men were skylarking near an open engine-room hatch they both fell down the ladder leading to the engine room. Each received severe contusions and was on the sick list for 3 days.

A fireman attempted to take a paring knife from a mess cook. He received an incised wound of the left hand with 3 days disability.

Flying particles—Lack of eye protection.—A machinist's mate received a foreign body in his right eye while using an emery wheel. He was in a hurry and neglected to protect his eyes with goggles. Loss of time 6 days.

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